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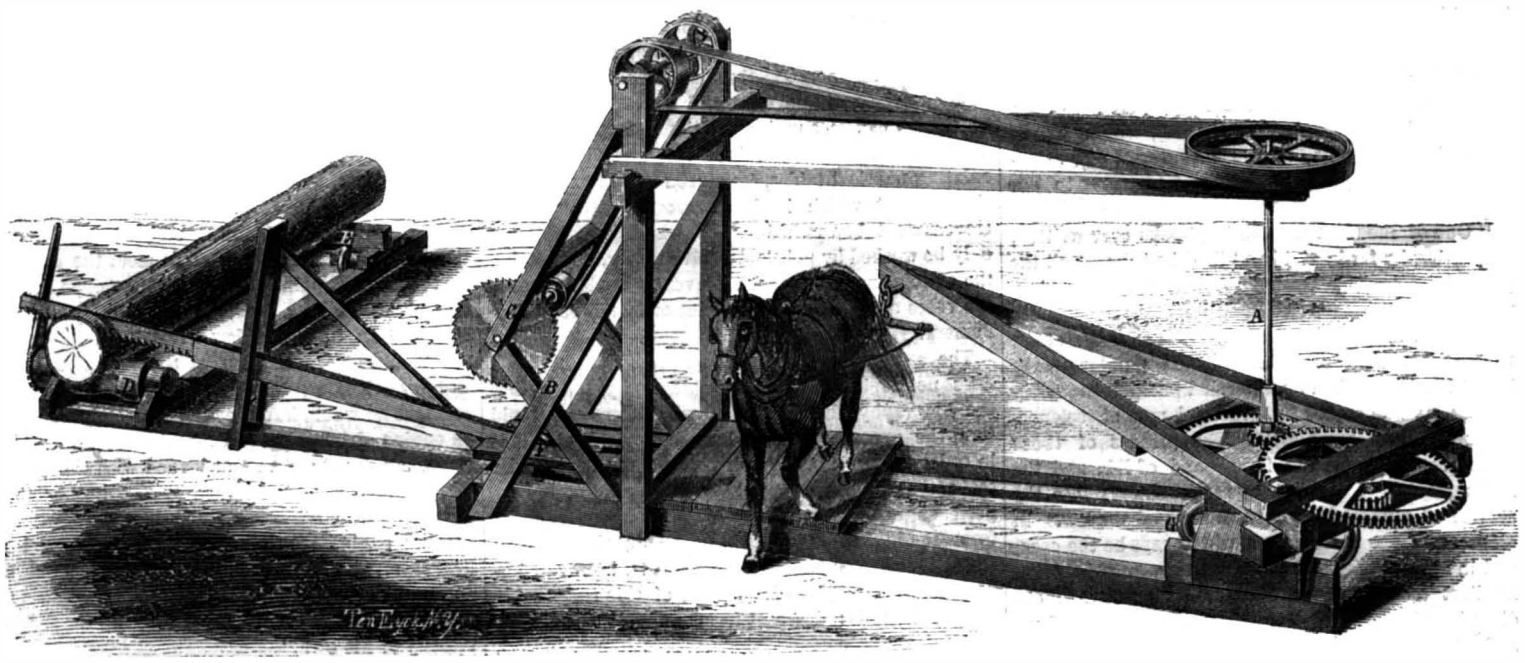
Improved Horse-Power Saw-Mill.

Wood-sawing is not such a delightful relaxation from care that men eagerly seek it as an amusement, and we therefore find that individuals are extremely contented when it can be deputed to some one else. Moreover, modern generations find that time is money, and that it is poor policy to saw one's own wood by hand when it can be done more cheaply and much quicker by machinery. We know of some instances where individuals have bought steam engines and gone about sawing wood publicly for a small sum. This brings us to the remark that the engravings published in connection with this article show an arrangement of a horse-power with circular and cross-cut saws, for the purpose set forth.



TOTMAN'S HORSE-POWER SAW-MILL

The artist has delineated the machine so plainly that we could add nothing that would make it clearer. The reader will see that the circular saw is caused to revolve by belting carried from the upright shaft, A, to a counter shaft, and that wood to be cut by it is laid in the horse, B. By taking hold of the swinging frame, C, the saw can be brought up against the log in the horse, quickly sundering it.

For cutting up large logs a carriage and reciprocating or cross-cut saw is used. The log rests on a spiked pillow or roller, D, at one end, and on a common carriage, E, at the opposite extremity, and is fed along at regular distances by a lever and ratchet-wheel at the front. The saw receives motion from the cross-head, F, which is driven by a wheel and crank, G.

It is obvious that the horse-power can be used for variety of purposes on a farm, apart from the machine that it is attached to, and it can be conveniently used to cut limbs, brush, or other lumber. It saws from twenty to thirty cords of wood per day with the cross-cut saw, and is easily run by one horse.

This invention was patented through the Scientific American Patent Agency by Edsell Totman, of Columbus, Pa., on March 14, 1865. For further information, address him at that place.

NEARLY 300,000,000 of our 5-20 bonds, or over half the whole issue, are now owned in Europe.

The Last Rebel Ram.

The *Stonewall* is a trifle more than two hundred feet in length over all, and has thirty-three feet breadth of beam. She draws, with two hundred tuns of coal on board, sixteen feet six inches aft, and twelve feet forward. She is plated with three and a half inch iron, backed inside with about three feet of teak or African oak, supported by diagonal iron braces of great strength, into which the bolts are securely fastened. Inside this again is a second plating, I should think about an inch in thickness. This structure extends up to the plankshear and waterways, which are of heavy oak. Above that comes an iron bulwark, bullet-proof, and made to fall in-board on hinges, in such a way as to present no obstruction in action. These bulwarks are about five feet high. The steamer is brig rigged, with bright lower masts; short mastheads, and spars painted black. She has only a small boom for a bowsprit, which rigs out through an iron neck, without stays or supports of any kind.

The *Stonewall* is armed with three guns—two seventy-pounders in her after and one three hundred pounder in the forward turret. These turrets are of African oak, stationary, and about eighteen inches in thickness, with a plating of iron one and three-quarter inches. There are five openings or port holes, to reach which we were told the guns could be turned by crews of fourteen men with great celerity, and that, in fact, they could be served as easily and quickly as howitzers. The great gun in the forward turret is served by eighteen men—the entire crew of the steamer, officers and men, amounting now to about seventy, but twenty more are to be shipped. Within the turrets are racks of cutlasses, fire-arms, pikes, etc., probably for repelling boarders. The three guns are marked "Sir William Armstrong," in large raised letters. An old sea-dog who was with us felt sure that they were not of English manufacture, but had been so marked for some special purpose. I think, however, that they are undoubtedly Armstrong guns. They are not black, like the American great guns, but streaked like the surface of a stub and twist shot-gun. They are kept beautifully polished, and, indeed, the whole ship has the appearance of being under rigid and perfect discipline. Every part of her is neat and cleanly, and all the rules of the best regulated naval vessels are observed.

But the most formidable feature of the *Stonewall* is the ram which forms her bow under water, and which projects about twenty feet beyond the bluff of the bows. As we stood on the forward turret we looked directly down upon this instrument. The bows of the steamer, which are iron-plated, slope insensibly down to the water's edge, and gradually disappear away forward under water in a huge round backed point, sharpened and curved as it descends under the water line, and presenting a sharp steel edge to the object of her attack. We were told that this does not sensibly affect the speed or maneuvering qualities of the ship, serving rather as an improved cutwater, and easing her motions in a head sea. Directly above is a port-hole, towards which the big gun was pointed; and, on butting an antagonist, this gun is always shell-loaded and fired directly ahead, thus breaking in the side of a ship under water and crashing at close range a two-hundred-and-fifty-pound shell into her simultaneously. The shot and shell of the big gun are elongated or conical, and claimed to be the most destructive yet invented. This ram is made smooth, so that upon hitting a ship she can instantly withdraw, retreat a short distance, and repeat the assault.

The disposition of the magazine, coal bunkers, provision and store rooms does not materially differ from that of other vessels of her character, being, of course, arranged with reference to economy of space and the engines and boilers. Altogether, below, she is a curious sight, and displays great constructive ingenuity.

It will be well for our Navy Department not to despise the destructive qualities of this nondescript. She combines all the qualities of our rams for harbor defense and attack with the seagoing advantages of an ordinary ship. That she has these latter none can deny, for she has steamed quickly and easily across the Atlantic, making fully an average passage, and arriving in these waters in good condition. The chief engineer admitted that the story given out in Ferrol that she was leaking was a mere ruse to gain time; and that in reality, she is tighter than any iron-clad he is acquainted with.

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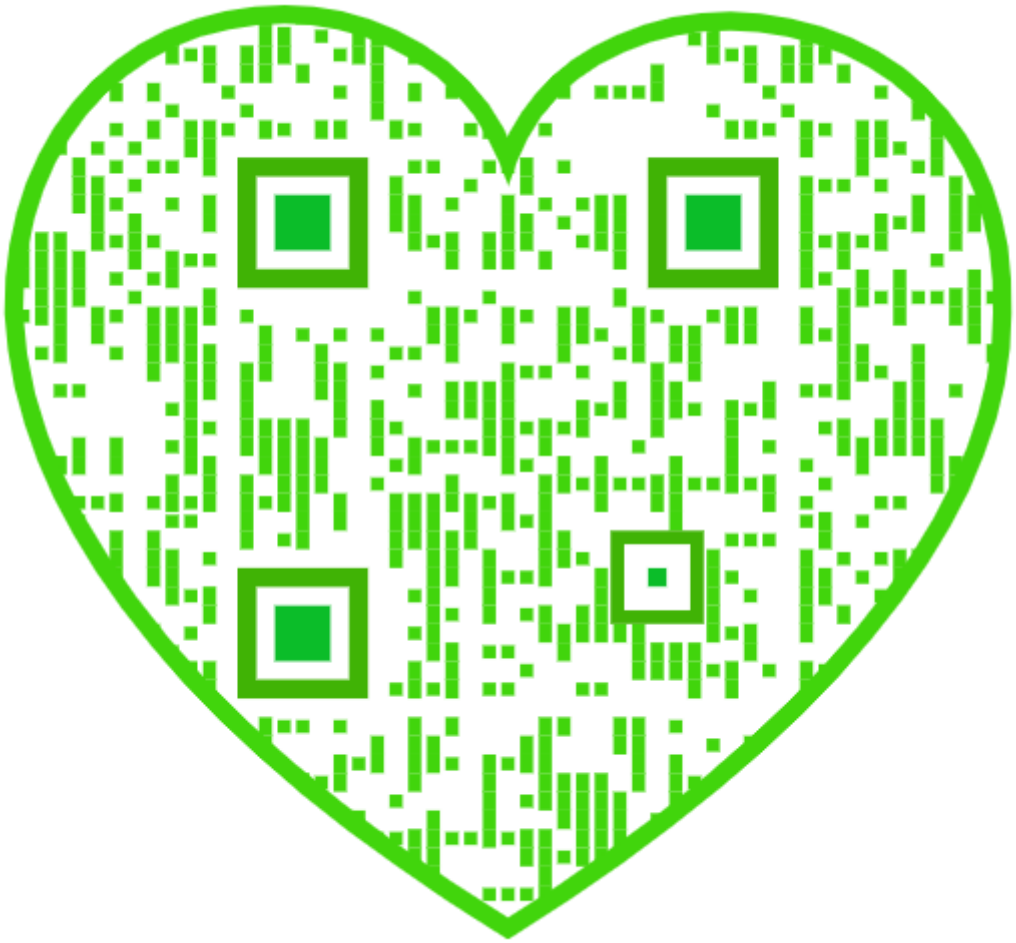

I should say that the *Stonewall* was vulnerable, if anywhere, on her decks. These are of wood, though iron-plated beneath. The descent of a series of plunging, heavy shells upon these decks would break them through, as was the case with one of the monitors in 1862, when attempting to pass Fort Darling. She might also he vulnerable to a determined and numerous boarding party. Attacked by two or more vessels at once, while engaged with one the other could range alongside and sweep her decks, which, unlike those of the famous *Merrimac*, are unprotected by any roofing. The man at the wheel is also quite uncovered. By driving the crew inside the turrets, the decks at least could be taken possession of. But leaving such speculations to abler and more experienced heads, I can but agree with all who have visited her that she is the most formidable engine of destruction that has yet been set afloat. Viewed bows on, with her great submerged snout rising and falling in the swell, her rounded lines of massive iron, and the grim, defiant aspect of the whole ship, she looks like some marine monster suddenly risen from the deep, breathing vengence to all enemies. This appearance is not lessened by the two hauser-pipes, serving as eyes, in the high and slanting bows.—*New York Herald Correspondent.*

PASSAGES FROM THE LIFE OF A PHILOSOPHICAL MACHINIST.

Under this heading the London *Engineer* gives an account of the mechanical life and pursuits of Mr. Charles Babbage, M. A., F.R.S., etc., who is chiefly known in this country as the inventor of the calculating machine. We transfer some passages to our pages:—

"One of the most interesting books ever written, surpassing by far in vivid and life-like interest all the printed dreams of sensation novelists, is the autobiography of that famous worker in metal, Benevenuto Cellini. In the middle ages, the leading artists of the time—the sculptors, architects, and painters—may be said to have taken up a parallel position in society to that now occupied by practical men of science, engineers, and machinists. The princes of those times then occupied the foreground of life, and the leading intellect of that age was drawn into the service of ministering to the luxury of the few. In different shapes and forms it will always be the case, and in all countries and times, that the most powerful intellect and energy are attracted towards those directions in which lie the greatest rewards of fame and wealth. With the modern increase in importance of the masses, the leading spirits of this age thus rather apply their energies to usefully ministering to the wants of the many. Instead of the development of the arts of luxury, the higher rewards, in every sense, to be found in success in the useful arts, accordingly impress in the service of the pure and applied sciences those leading minds who, in less happy times, might have devoted their energies elsewhere. In fact, the successful inventors, the engineers and chemists of our time, form an aristocracy of intellect similar to that in which figured the names of the Leonardo da Vincis, the Raphaels, or the Titians of the middle ages. Indeed, Da Vinci and Michel Angelo were both men furnished with all the scientific lore of their period, and both gave proofs of high constructive talents, while Cellini himself, if he now lived, would doubtless prefer to work in iron instead of in gold and silver, and his autobiography, instead of being an account of his adventures in fulfilling the luxurious behests of mediæval princes, would be rather the history of a modern man of science or of an engineer. Allowing for many obvious differences, it is probable that the general tone of this autobiography would be very like that of a similar work recently published by one of our most eminent men of science. Much allowance must indeed be made with parallels of this kind, but we should say that there is a considerable likeness between Mr. Babbage and the celebrated Italian. Both show the same self-conciousness, egotism, and intense pugnacity, and the written passages from their lives are so absorbing in interest that the books of both must be read through before they can be put back on the shelf.

In his relation toward our profession Mr. Babbage belongs to a generation which is now fast passing away. The things for which he is known in the world of science were achieved many years ago, and those who may have never even heard of the calculating machine, or who may have never read "The Economy of Manufactures," only know his name as a persistent prosecutor of Italian organ grinders. In this age of decorous mediocrity, when everybody is very much like everybody else, the irritation of a nervous *savant*, who perhaps cares but little for the opinions of newspaper readers, is put down to unreasoning eccentricity.

The remarkable combination of both the mathematical and constructive faculties required from the inventor of the calculating engine is very rare indeed, and the intimate union of these faculties undoubtedly raises their possessor to the rank of a man of genius. Invention and judgment combined cannot fail to achieve much; but without judgment you have the mere schemer—while judgment, however high, without invention, seldom results in more than a lifetime of judicious copying. Accordingly as the inventive powers are combined with scientific judgment is the amount of scientific success; but to make money—and even, perhaps, durable fame—knowledge of the world, worldly cautiousness and judgment are also required. The faculty of invention, like the gift of beauty, is not unseldom a fatal gift; and often misleads its possessor with a Will-o'-wisp light. There can be no doubt that Mr. Babbage would have been a much wealthier man, while he would have led a much more tranquil life, if he had never invented his calculating engine. This is more especially the case, as his works could never appeal directly to the wants of the public. Though of national interest, on account of the immense value of the machine in calculating nautical tables, its patron could only be the Government, which is always a sorry patron. Our Government is a machine, the wheels of which can only be worked by political motive power, and neither the calculating engine nor its inventor could influence the votes of either constituencies or members of Parliament.

The author tells us, in his preface, that his book does not aspire to be an autobiography, but rather the biography, the history of what Germans would term the genesis, of his calculating machines. It is in order to render the book palatable to the popular taste that Mr. Babbage gives an account of his experience among the very varied strata of society, from the highest down to the artisan classes, with which it has been his lot to mix. It is, however, impossible to attempt a description of this remarkable apparatus, in its different forms and in its progress, without the help of drawings. This is not, indeed, aimed at in the work befores us. Its history during the last twenty years, the account of the development of the calculating machine into the analytical engine, and of the varied complicated and unpleasant relations of the author with the Government, are scarcely less intricate. We understand that another work by Mr. Babbage, more especially devoted to these matters, is in the press. Of more direct interest to ourselves are other points in this very remarkable book. For years a member of the highest social and scientific circles, the author, even when not a worker, has been an intimate spectator behind the scenes of most of the different mechanical and scientific achievements that have given the color to the present time.

BABBAGE ON RAILWAYS.

An extremely interesting chapter in Mr. Babbage's autobiography is that on "Railways." The inventor of the calculating machine and the author of "The Economy of Manufactures" naturally took a great interest in the development of the railway system. He was present at the opening of the Manchester and Liverpool Railway in 1829. Just previous to the fatal accident which happened to Mr. Huskisson, the author saw him "but a few minutes before standing at the door of the carriage, conversing with the Duke of Wellington." The Duke is stated to have wished to at once return back to Liverpool, but the Borough-reeve of Manchester pressed upon him and Sir Robert Peel "the necessity of continuing the journey, stating that if it were given up he could not be answerable for the safety of the town." The popular agitation among the inhabitants of Manchester and the neighborhood was so great in consequence of the disaster caused by a novelty, the first introduction of which had been so much opposed, that "for several miles before" the trains reached their destination "the sides of the railroad were crowded by a highly-excited populace shouting and yelling." At a dinner at the house of one of the great Liverpool merchants, during a discussion of the new mode of locomotion, the great danger of obstacles placed accidentally on the line was pointed out. Mr. Babbage observes that he proposed the contrivance now employed in America under the name of "cow-catcher." His other suggestion of "a strong leather apron attached to a powerful iron bar," is not, however, in use, as he seems to think. There can be no doubt that the ordinary vertical guard plate, generally attached to the engine "has a tendency to throw the obstacle straight forward upon another part of the rail." In fact more than one accident caused by slight obstruction has been traced to its use. There is, however, a goddess of fashion ruling the use of guard bars as well as the crinolines. Mr. Babbage is a strong adherent of the broad gage, having, in 1838 and 1839, during the "Battle of the Gages," made some elaborate experiments in order to determine its value in producing steadiness of running.

In the course of his experiments on the *Great Western* he had a very characteristic adventure with the late Mr. Brunel. He found it necessary to conduct his investigations on Sundays, as being the only safe days, and with all the less impropriety as the task was anything but profitable to himself, while it was intended to contribute to the safety of all travelers. Naturally expecting, after the departure of the only Sunday train, that the line would be quite clear, he prepared to start. But just as he was doing so he heard a distant sound of a locomotive, and in a few moments up came a single engine, at the rate of fifty miles an hour, and on the the same pair of rails as his own. Having stopped just in time, he went up to this, on which he found Brunel, who told him that "he had posted from Bristol to meet the only train at the farthest point of the rail then open, but had missed it." Having, however, found this engine with its steam up, he had ordered it out, driving up in it the whole way to London, at the rate of fifty miles an hour. Having told him that but for the merest accident he would have been met on the same line by an engine driving Mr. Babbage's experimental carriage, besides three wagons loaded with thirty tuns of iron, Brunel was then asked by the author "what course he would have pursued if he had perceived another engine meeting him upon his own line?" Brunel replied that "in such a case he should have put on all the steam he could command, with a view of driving off the opposite engine by the superior velocity of his own."

Here is another very good story, and this time about George Stephenson:—Happening to sit next to the "father of railroads" at a large public dinner during the meeting of the British Association at Newcastle, in 1838, he determined to extract a candid opinion from Mr. Stephenson as to the respective merits of the board and narrow gages. Remembering the great truth that *in vino veritas*, he waited till after the second glass of champagne—having previously paved the way by some conversation on other questions connected with railway economy. He then asked George Stephenson to suppose for a moment that no railways whatever then existed, and that he had to begin their entire construction by the light of his acquired experience. "Under such circumstances," asked Mr. Babbage, "if you were consulted respecting a gage of a system of railways about to be inaugurated, would you advise a gage of 4 feet 8½in.?" "Not exactly that gage," replied George; "I would take a few inches more, *but a very few*"—a reply which is likened to the celebrated excuse of the young lady who had had an illegal, "but very small" baby. The author makes the very good proposal that the building of the next International Exhibition should be provided with a railway for taking passengers from end to end, and thus avoiding the crowd. Indeed, it is more than likely that much crowding could be thus prevented.

HIS PROFESSIONAL ABILITIES.

While it is impossible to term Mr. Babbage a mere amateur mechanic, he does not seem to have professionally worked in any other direction beyond that of his calculating machines. He has, however, devoted more philosophical attention than anybody else we know to manufacturing generally, and the use of tools. A work by which Mr. Babbage's name has become known among practical men is that on "The

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Economy of Machinery and Manufactures." In his analysis of the great principle of the division of labor, first discovered by Adam Smith, he pointed out an omission, the importance of which will be well understood. The advantages of the division of labor do not merely consist in the increase of dexterity in every particular workman, in the saving of time otherwise lost in passing from one kind of work to another, and in the division of labor rendering possible the adaptation of more or less special machinery—which are the principles pointed out by Adam Smith. There is another most effective source of economy. This consists in the possibility, through the division of labor, of "dividing the work to be executed into different processes, each requiring different degrees of skill or of force" By this means the employer "can purchase exactly that precise quantity of both which is necessary for each process." If, on the contrary, the whole work has to be done by one workman, he must have sufficient skill for the most difficult, and must possess "sufficient strength to execute the most laborious of those operations into which the art is divided." A conclusion very interesting to patentees is arrived at with respect to monopolies. He states that he is able to demonstrate "that, even under circumstances of the most absolute monopoly, the monopolist will, if he knows his own interest and pursues it, sell the article he produces at exactly the same price as the freest competition would produce." We regret to say that if this demonstration has been published at all, it has only made its appearance in Italian, as the author says that he only devoted a chapter to this subject in one edition, prepared several years ago, for a new Italian translation of "The Economy of Manufactures." We believe that many enlightened patentees have, indeed, arrived at a similar conclusion from practical experience. It is clear that the cheaper the price of any manufactured article, the greater the demand for it; while the monopoly obtained by means of a patent absolutely, precludes competition. There are, besides, other reasons why, in most cases, it is the safest plan to demand as low royalties as possible. Such is the diminution of the chance that the patent may be attacked in a court of law.

HOW TO BREAK A HOLE IN GLASS

Scattered through the work are a number of practical little receipts and descriptions, very interesting to the amateur and even professional workman. Under the nomenclature of "hints for travelers" we thus find described a very ingenious way of punching a circular hole in glass. This is done by scratching a cross (×) upon the given spot by means of the point of a file, and then turning the plate round, in order to form a similar and opposite cross. The glass, at the spot thus marked, is, thereupon, so to speak, gently punched out by means of two center punches, one of which is fixed in the vise, while the other is in the hand of the operator—an assistant holding the plate of glass in the meanwhile. The glass plate is occasionally turned round until the hole appears right through, which is then gradually enlarged with the pane of the hammer.

The principles on which the hole is formed are, that though glass breaks with a conchoidal fracture in every direction, the vibrations caused by the blows, and otherwise producing fracture, "are checked by the support of the fixed center punch in close contiguity with the part to be broken off." He offers other and higher results of his reflections on the manufacture of complicated mechanism, though we do not think that, in this generation at least, much attention will be paid to them in practice. In the course of his progress with the *Difference* engine and its complicated mechanism, involving an enormous number of drawings, Mr. Babbage elaborated what he terms a system of mechanical notation. An ordinary set of drawings of any machine, of course, ought to show the actual shape and relative position of every piece of matter of which the machine is composed, but his system of mechanical notation also affords facilities for ascertaining "the actual time and duration of every motion throughout the action of any machine," and "the actual connection of each movable piece of the machine with every other with which it acts." It is more than probable that if such a system of notation were taught in schools, it would be very useful to machinists. Its value could, however, only be really felt when it was universal currency, and its general introduction would have to encounter the same difficulties as the introduction of short-hand as a substitute for ordinary handwriting. With ordinary drawings of complicated mechanism referring to a description, Mr. Babbage recommends the adoption of a system in the choice of the lettering. One or two of his rules for the selection of letters are that "all upright letters, as a, c, d e H, B, represent framing; all inclined letters, as *a*, *c*, *d*, *e*, *A*, *B*, represent movable parts – all small letters represent working points." He states that one of the most obvious advantages of these rules is that they enable the attention to be more easily confined to the immediate object sought.

Purple Dye from Theine.

A German chemist is said to have produced most splendid purple and scarlet dyes, almost surpassing in beauty the finest of the aniline dyes, from "theine," the alkaloid to which tea and coffee owe the refreshing and stimulating properties which have brought them into such general request all over the world. As the kinds of Chinese tea which are richest in theine do not contain much more than two per cent of that substance, the new dyes, however valuable in themselves, could scarcely come into extensive use if Chinese tea were the only available source of the alkaloid from which they are derived; but, fortunately, there are other sources of that body. Not to speak of the kola-nut of West Africa, which has just been discovered to contain theine, the leaves of the Paulina Sorbilis contain nearly five per cent of that alkaloid, and those of the Ilex Paraguaensis are also very rich in it. The Paulina Sorbilis is a Brazilian tree, belonging to the same family of plants as the English horse-chesnut. The locality in which it chiefly flourishes is the great valley of the Amazon. Its fruit, when ripe, is dried and pounded to powder, and the powder is made into a thick paste with water. This paste is molded into cakes, which are baked by the heat of the sun, and then constitute the famous "Guarana bread." A spoonful of the powder obtained by scraping one of these cakes, added to a pint of boiling water, makes a very refreshing beverage, which is largely used throughout the Brazils. Still more largely used, however, both in the Brazils and in other parts of South America, is an infusion of the leaves, etc., of the Ilex Paraguaensis, or "Paraguay tea-plant,"—a plant belonging to the same order as our English holly. In the forests of the Brazils and Paraguay this plant grows wild in enormous abundance The natives gather its leaves, buds, and young branches, dry them, and reduce them to a coarse powder, which powder they then use much as we use Chinese or Indian tea. This powder does not contain so large a percentage of theine as is contained in the Guarana bread, but in contains nearly as large a proportion as the best Chinese tea, and as it is calculated that fully *two millions of pounds* of the leaves of the tree from whose leaves and twigs the powder is made fall to the earth and rot every year, in the forests of Paraguay alone, if theine dyes should prove to possess, intrinsically, any real advantages, it need scarcely be difficult to produce them cheaply enough.

On the Mechanical Principles of the Action of Propellers.

At a late meeting of the Institution of Naval Architects, London, Prof. W. J. Macquorn Rankine made an interesting address on the above subject, of which the following is an abstract:—

After remarking that the ordinary theories, based upon the assumption that the reaction of a paddle float or screw is equivalent to the resistance of a surface of the same size and figure advancing through the water, lead to results very much in defect of the actual performances of these propellers, Professor Rankine pointed out that the true condition of propelling instruments is different, seeing that the propeller is continually laying hold of a series of new masses of water, so that the quantity of water on which it acts in a given interval of time depends mainly on the speed of the vessel. Mr. Rankine remarked that the only previous author that noticed this fact seems to have been Mr. Bourne, who, however, did not work out the consequences. The object of the paper was to point out what, in the author's view, appeared to be the correct theory of the action of propellers, in a shape adapted for practical application, and to illustrate it by examples founded on actual ships—the *Admiral* for feathering paddles, and the *Warrior* for the screw. The whole of the mathematical investigations and numerical calculations were added in an appendix, the body of the paper containing an account of the principles. Throughout the greater part of the investigation, one constant only is taken from experiment, viz., the mass of a cubic foot of sea water, being its weight in pounds, divided by the accelerating effect of gravity in a second. In that part of the investigation which relates to the friction of screws, one more constant only is taken from experiment, viz., the co-efficient of friction of a disk rotating in water.

The following general results with regard to the efficiency of propellers, neglecting friction, were stated to be applicable to all kinds of propelling instruments:—1. When the propeller works in previously still water there is a loss of work simply proportional to the slip of the propeller; 2. When the propeller works in water previously set in motion by the ship, there is, in the first place, a loss of work proportional to the real slip of the propeller relatively to that moving water, and then a further loss of work, proportioned to the square of the previous velocity of the water.

The probable effect of the friction of a screw was also investigated. When calculated by the formulæ obtained in the paper, the power expended in actually driving the paddles of the *Admiral* was found to be 77 per cent, and in driving the screw of the *Warrior* 77½ per cent of the actual indicated power, while the efficiency of the propelling instruments themselves is found to be 0·78 for the paddles of the *Admiral*, and 0·773 for the *Warrior's* screw. Combining these data, the resultant efficiency of engines and propeller, for both ships, is found to be 0·6, or 60 per cent of the indicated power. When the effective thrust of the paddles or screw was calculated theoretically, and compared with the resistance of the ship computed according to the principle laid down in the paper read before the Institution, by Prof. Rankine, in 1864, the difference in the case of the *Admiral* was found to be 1·224th, and in that of the *Warrior* 1-70th part of the whole resistance; both these differences being within the limits of errors of observation. Prof. Rankine added the remark, that, for such comparisons to be made in a satisfactory manner, it is necessary to have the lines of the vessel.

Velocity of Electricity.

Of the velocity of the spark discharge some notion may be formed from the brief duration of its light which cannot illuminate any moving object in two successive positions, however rapid its motion. If a wheel be thrown into rapid rotation on its axis, none of its spokes will be visible in daylight, but if the revolving wheel be illuminated in a darkened room by the discharge of a Leyden jar, every part of it will be rendered as distinctly visible as though it were at rest. In a similar manner, the trees even when agitated by the wind in a violent storm, if illuminated at night by a flash of lightning, appear to be absolutely motionless.

By a very ingenious application of this principle, Wheatstone has shown that the duration of the spark is less than the one-millionth part of a second. The apparatus is the same in principle as the revolving wheel.

By a modification of the apparatus, Wheatstone was also enabled to measure the velocity with which the discharge of a Leyden jar was transmitted through an insulated copper wire. He estimated the rate of its passaga at 288,000 miles in a second.

A PHILADELPHIA distillery is kept clear of rats by baiting fish hooks about half an inch long and a quarter of an inch across the hook with dried beef. The hooks fasten in their mouths and throats, and speedily every rat disappears.

[That is to say, the rats swallow hook and all.—EDS.

To preserve entomological specimens, M. Gerber employs an etherial solution of carbolic acid with ten per cent of the latter, which he finds to effectually protect the insects even in a place infested with ants. He recommends the solution especially therefore to entomologists making collections in hot countries.

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POLYTECHNIC ASSOCIATION OF THE AMERICAN INSTITUTE.

The Association held its regular weekly meeting at its room at the Cooper Institute, on Thursday evening May 10, 1865, the President, S. D. Tillman, Esq., in the chair.

EXPANSION OF WATER.

Dr. Rowell exhibited the apparatus usually employed to observe the expansion and contraction of water with changes of temperature. It was simply a large thermometer tube with a bulb as big as an egg; the bulb and part of the tube being filled with water. The bulb is surrounded by some freezing mixture; a thermometer is employed to measure the temperature of the water, and the changes of volume are indicated by the rise or fall of water in the tube.

Dr. Rowell remarked that when the water was at about the freezing point, if the bulb were grasped in the hand it was surprising to see the water in the tube continue to sink by the warming of the liquid till it reached 39·2°—the temperature at which water reaches its maximum density. When the liquid reaches the freezing point and begins to crystallize, the water rushes right up the tube, and the bulb must be taken instantly from the cooling mixture, or the glass will be broken by the rapid expansion of its contents.

EXPANSION OF OTHER SUBSTANCES.

The President observed that it would be very interesting to know whether iron and other substances follow the same law as water, in having their maximum density a few degrees above their temperature of solidification.

Dr. Parmelee suggested that it would not be easy to measure with precision either the temperature or specific gravity of molten iron.

Professor Seely suggested that the specific gravity of molten iron might be measured by means of a mass of solid cast-iron, fashioned in the form of a hydrometer.

Dr. Rowell offered an objection to this, that a coating of molten iron would chill about the mass, and operate as a raft to float it at the surface.

Mr. Fisher proposed that the hydrometer should be made of wrought iron, and heated to the temperature of the melted iron before it was immersed.

BUTTON MAKING.

The President announced that the regular subject of the evening was the manufacture of buttons, and said that Mr. Miller was expected to read a paper on it, but that he had received a note from Mr. Miller excusing himself on the ground of ill health. He therefore called for remarks on the subject from any one present.

Dr. Rowell said that when he was a boy it puzzled him to think how the eye could be fastened in a button without coming through; after many years he received an explanation. A recess is sunk in the back side of the button, and this recess is cut under or enlarged at the bottom. Then the eye is soldered to the convex side of a saucer-shaped piece of metal which is just small enough to enter the recess, when, by a blow or press, it is flattened and spread so as to fill the recess in the lower and enlarged portion.

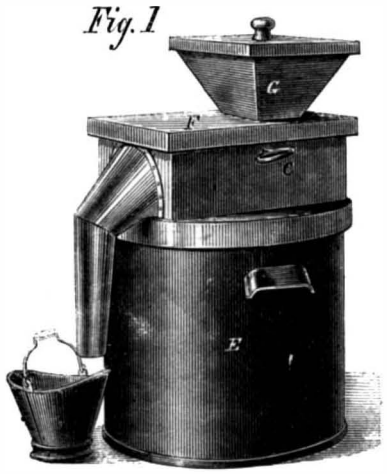
Mr. Bartlett stated that a Frenchman had invented a button distinct from the eye, so arranged that the eye can be readily fastened to the cloth by means of a peculiar needle without any sewing, and then the button can be attached to the eye by simply pressing it down and giving it a quarter turn. The speaker is acquainted with some gentlemen belonging to the company who have purchased the patent, and they say that the sum paid for it in cash was $125,000.

Mr. Blanchard remarked that the town of Waterbury, in Connecticut, has the most varied and extensive manufacture of brass articles of any place in the country, or perhaps in the world; and all sprang from one man making a set of brass buttons for his own wear. He was rather an ingenious man, and he thought he could make a set of brass buttons cheaper than he could buy them. He punched out the blanks from a piece of sheet brass, turned them up very nicely in a lathe, soldered eyes to them, and had them sewed upon his coat. Some of his neighbors then requested him to make sets of buttons for them, and he was thus drawn into the manufacture. His example was followed by others, and from this small beginning have grown up the extensive brass manufactures of Waterbury.

GILBERT'S COAL AND ASH SIFTER.

All economical housekeepers sift their coal ashes, for a large proportion of the quantity daily carried out is fit to burn over. In addition to the coal which lodges in the corners of the grate and at the back, where it is only half burned, a great deal of green fuel falls into the ash-pit which, if not extracted, is

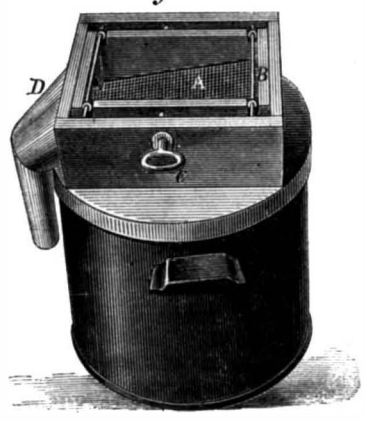
Fig. 1



a dead loss. But little more than half the coal is burned in a stove or range, for fully half a scuttle of cinders may be taken out of double that amount of coal.

The sifter here shown is well arranged to perform a disagreeable duty. Ordinary sifters are heavy, throw ashes all around, and make a muss generally. In this sifter, however, we have a very good arrangement for the purpose. No heavy lifting is needed; no straining of the arms occurs, and the ashes are entirely separated from the cinders and confined in the cylinder. In Fig. 2 the internal arrangement is shown; it is merely a sieve, A, hung on rods, B,

Fig. 2



across which it slides by pushing the handle, C, back and forth. The bottom is inclined so that the ashes separate easier and the cinders roll off to the chute, D, from which they drop into the scuttle below, while the ashes are contained in the drum, E. The cover, F, fits tight over the sieve, but can be taken off at any time, and the hopper, G, is for an obvious purpose. A patent was issued on this machine through the Scientific American Patent Agency on the 21st of March, 1865; for further information address Emery & Hutchinson, assignees and manufacturers, 57 Canton street, Boston, Mass. [See advertisement on another page.]

The Wear and Tear of Steam Boilers.

In an elaborate and highly interesting paper on this subject, read before the Society of Arts, recently, by Mr. F. A. Paget, C.E., it was observed that it is clear that, subjected as a steam boiler is to many destructive influences, the precise effects of which can scarcely be accurately known, the working tension should be only one-eighth of the ultimate bursting strength. But when boilers, as is too often the case in England, are bought by the weight, when cheaply-paid labor is employed in their management, when inspection of the progress of wear and tear necessarily happening even with good boilers and good attendance, is procrastinated for the sake of gain, there is then a suit of expense *versus* risk, in which parsimony too often gains the day At any rate, a number of painful accidents in all parts of the world have, at different times, pointed to the fact that every man picked at hap-hazard cannot be safely trusted with steam-power. In fact there is probably no civilized country in which the legislature has not more or less interfered in the management of steam boilers. In the States of America the frequency of boiler explosions has in some localities produced a more despotic interference than perhaps anywhere else. In the city of New York boilers are under the supervision of the municipal police; they are tested periodically, and, as a result, many are condemned every year. By an enactment of Congress, applicable to all the States, steam passenger vessels are subjected to Government inspection. The 13th section of this Act shows a very acute perception of the real cause of a boiler explosion, "which," it states, "shall be taken as full *prima facie* evidence" of negligence on the part of the owner, upon whom is thus put the onus of disproof. The law of Louisiana is particularly severe, requiring the application of a hydraulic test threefold that of the working pressure. There are three distinct plans for the management of steam boilers:—1. There is the continental plan. 2. The free English and American mode. 3. What may be termed the Manchester system. The continential mode consists in a strict supervision, sometimes ruled by formulæ of the original construction, and there its action may be said, for the most part, to end. It does not, and cannot, without periodical inspections, take into account the effects of wear and tear. It may even be doubted whether the old French law, for instance, did not do more harm than good as regards construction. The official formulæ, according to which were calculated the thickness of the plates, founded, as it was, upon the assumptions that a cylindrical boiler formed an exact circle, and that a plate, however thick, conducted the same amount of heat to the water, was obviously incorrect. What may be termed the ordinary English and American plan throws the onus of proof of the negligence of the owner on those damaged by an explosion. This system is subject, besides other difficulties, to all the objections that exist against the trial of scientific questions by a jury, not composed of experts, and unaided by scientific witnesses. The continual occurrence of explosions in those cities and States of America in which boilers are used without any supervision by the authorities, and their undue occurrence in England with boilers not subjected to systematic inspection, sufficiently prove steam boilers cannot be worked at hap-hazard. On the other hand, the system of organized inspection by the English boiler companies, and the similar system, according to which the passenger vessels are inspected by Government officers, have given universal satisfaction. A proper estimate of the value of the Manchester and Board of Trade system could only be well based on numerous statistics. Unfortunately, such do not appear to have been formed. It is stated, however, that in an average of 277 boilers, there were two explosions in the French department of the Haut-Rhin within ten years; and, from 1856 to 1861, or within five years, there were only two explosions in an average of 1371 boilers, under the care of the Manchester Association.

THE oil wells in Burmah, India, it is estimated, have been yielding their present supply of 800,000 barrels per annum at least 100 years, amounting during that period to about 80,000,000 barrels, English measure. These, if arranged, would form a continuous line of oil barrels 27,300 miles long. Oil wells also exist in Persia, and, it is said, have lately been discovered near the Sea of Azof, while on the island of Samos they existed 500 years before the Christian era.

THE Russian railway, between the Black and Caspian seas, is progressing rapidly—20,000 forced laborers being employed. It is to be finished next year.

IT is stated that there were 1,300 acting appointments conferred on engineers in the navy during the late war.

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Improved Aerovapor Blower.

It has long been known to persons familiar with the arts that jets of steam directed into a furnace promote combustion by creating a draft and keeping the burning fuel free from ashes, which tend to choke it so that air cannot pass through. The apparatus illustrated herewith is designed to accomplish this object, and has another novel feature which we shall describe. This feature is the introduction of air with the steam, or, as it has been called, "cloud steam," so that the blower also answers the same purpose as a common fan blower, with the additional advantage of the steam jet.

This blower is designed to set in the casing of the furnace below the grate, and is externally a cast-iron box, A, with doors, B, opening outward. Inside the

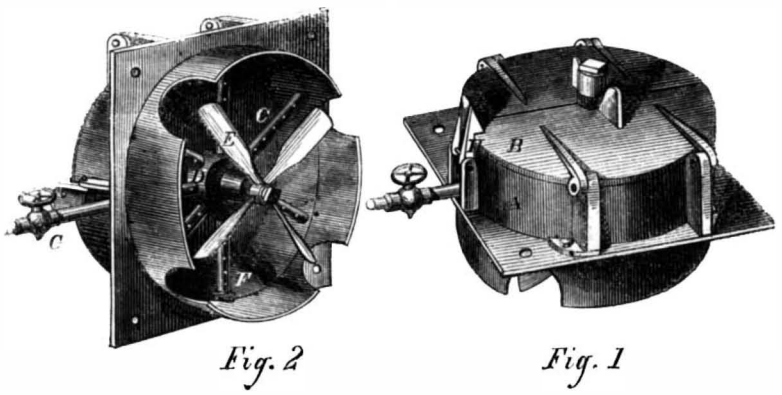


Fig. 2 Fig. 1

STRANGE AND HUNTLEY'S AEROVAPOR BLOWER.

box there are pipes, C, Fig. 2, which support a hollow bearing, D, Fig. 2, in which the shaft of the wind wheel, E, Fig. 2, runs. These pipes are perforated with small holes, F, through which steam is forced against the wheel, E; this causes it to revolve rapidly, creating a current of air through the box when the doors, B, are open The steam, which may be supplied directly from the boiler or the exhaust, is admitted by the globe valve, G, and the doors are closed and held so, when desirable, by catches, H, Fig. 1.

The inventors claim that the combined effect of the air and steam is better than steam alone, and that the decomposition of the steam by the heat of the furnace adds to the efficiency of the fuel, so that it is economical to use. When the air is not required, the outer doors may be kept shut, and the wheel locked or allowed to rotate at will. This blower may be applied to steamboats, locomotives, stationary boilers, or forge fires when a supply of steam can be had, and is noiseless and economical in action.

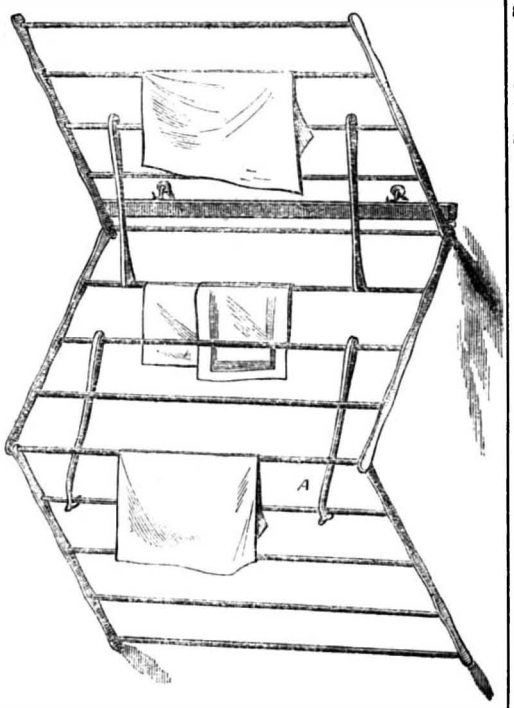
The invention was patented through the Scientific American Patent Agency on March 11, 1865, by E. C. Strange and G. R. Huntley, of Taunton, Mass., and is manufactured by the Taunton Steam Fan Blower Co., Gilbert W. Pratt, Agent; also for sale by Leach Brothers, No. 86 Liberty street, New York. For further information, address either party as above.

Steel Locomotives.

The Maryport and Carlisle Company have for some time past employed steel to a great extent in substitution of ordinary iron for the working parts of locomotives, and, as we are informed, with the most satisfactory results. The traffic on the line is principally coal and mineral. It has been found that with the ordinary iron tires on the engine wheels, the distance run was not more than 90,000 miles—in many cases not more than 60,000 miles—and the wheels require to be taken from under the engine for every 20,000 or 30,000 miles run, for repairs and "turning up." In the case of the steel tires, however, the wheels will run 100,000 miles before they require "turning up" or repairing. The *Railway News* states that the result of a very careful examination of the effects of wear leads to the opinion that these wheels will run from 350,000 to 500,000 miles, or equal to some twelve or fifteen years' work of a daily average of about one hundred miles. The difference of cost as between the two metals is not great; in the one case it ranges from £40 to £45 per tun, while the steel is about £55, the cost of labor in placing the tires on the wheels being nearly the same in each case. The company have a number of boilers, axles, cranks, and eccentrics, made of steel in constant use on the line, and they have given the greatest satisfaction. These have not, however, been sufficiently long in operation to enable a comparison to be drawn between them and the ordinary iron portions of the locomotives; but there is reason to believe that the saving in point of wear will be equal to that effected by the substitution of steel for ordinary iron tires. The ordinary eccentrics are expensive to keep up, but those which are made of hardened steel do not require any looking after for ten years, not even to the slackening of a bolt, so far as regards repairs. The experience obtained on this, and we believe on some other railways, points to a very important mode of saving in one of the largest items of cost in the working expenses of railways. The subject will, we have no doubt, receive careful consideration from the managers of railways. —*Mechanics' Magazine.*

SIMS'S CLOTHES HORSE.

Considering expense, utility and convenience, the clothes horse here illustrated is a desirable piece of



furniture for family use, and will prove satisfactory for the purpose required. It consists of three sections of bars, as represented, which are suspended by hooks to the wall of the house, either in or out of doors, as may be thought desirable. When not in use it may be hung suspended against the wall of the room, occupying no space available for other purposes. When wanted it is easily adjusted by the braces, A, one set of which hooks over the bottom set and holds it up, and they can be taken down, folded into small compass, and put away until another occasion.

The patentee is induced to believe, from numerous testimonials he is daily receiving from those who have tested its merits, that his invention is a great acquisition to the laundry. This invention was patented through the Scientific American Patent Agency, Jan. 31, 1865, by Elbridge Sims; for the purchase of the article or other information, address him at Antwerp, N. Y.

NOYES'S TRAVELER'S LUNCH BAG.

Tourists and travelers generally know what dyspepsia-engendering things railroad restaurants are. The food is not only poor in quality but is kept cooked so long that its flavor is lost and its wholesomeness much impaired; withal, the prices asked are as high as those at first-class city hotels.

We think the lunch bag for travelers, here illustrated, a useful thing, for by the employment of it one can always be sure of lunch when it is wanted, and if prepared at home, be certain of its cleanliness and good quality. Outwardly this bag is a handsome Russian leather traveling case, with a compartment, A, at the bottom, wherein are several tin cases, B. One of these is intended for the special reception of a cologne (!) bottle, and the others are designed to hold divers and sundry appetizing dainties of whatsoever name and nature individuals may fancy.

Respecting further details the inventor says:—"The method of using this bag is too simple to need explanation. Lay it flat on your knees, and open it by the keyhole at the bottom, and it will tell its own story. Fill it at home, and it will last you for any ordinary journey. If your trip is long, replenish at the groceries, bakeries or cook-shops. In this way you will save money enough in a few journeys to pay for your bag, and at the same time keep your health and enjoy your food better than ever. Provisions of the fluid or semi-fluid sort cannot well be carried in this or any other bag, unless inclosed in tight cans or bottles. But many soft articles—such as pies and even compact puddings—can be carried safely and without care to keep them 'right side up.' Dry provisions with fruit, and something in the flask to wash them down, are the best outfit for general travel. The knife, fork and napkin are held in place by clasps on the cover.

"In the latest patterns of the lunch bag, the movable tin box is a *square* cylinder; that is, it is as deep as it is wide, so that it can be inserted with the lid facing upward or sideways at pleasure. A ring on one side is provided for the purpose of drawing out the tin when it is inserted with the lid uppermost. This arrangement obviates the objection to carrying provisions in a box lying on its side. When the bag is to be carried in the hand, the tin may be inserted so that it shall be right side up; and on sitting down to lunch, it may be drawn out by the ring, the bag laid on its side, and the tin inserted the other way with the lid opening upward still. In this way articles more or less fluid may be carried with a little care. The tins should be taken out to be cleaned, and may be removed altogether if, on particular occasions, the whole room is wanted for clothing. These bags, though designed especially for railroad travel, will be found very desirable accompaniments of pic-nics, fishing and hunting excursions, and all sorts of pleasure jaunts; and, with some modifications, will suit soldiers, trappers and school boys."

A patent was procured on this bag through the Scientific American Patent Agency, by J. H. Noyes, on the 18th of April, 1865. For further information address "Oneida Community," Oneida, N. Y., or at their Agency, 335 Broadway, New York.

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Correspondence

A New Rubber Cement.

MESSRS. EDITORS:—I have purchased rubber cement of different makers but have found none so inexpensive or that dries so rapidly as a kind made with benzine in the following manner:—Cut virgin or native rubber with a wet knife into the thinnest possible slices, and with shears divide these into threads as fine as fine yarn; the finer it is divided the better the cement and quicker made. Put a small quantity of the shreds (say one-tenth or less of the capacity of the bottle), into a wide-mouthed bottle, and fill it three-quarters full with benzine of good quality, perfectly free from oil—such as may be procured at any paint shop for about 60 cents per gallon. The rubber will swell up almost immediately, and in a few days, especially if often shaken, assume the consistence of honey, with a thick sediment at the bottom, which does no harm. Of course it must be kept well corked except at the time of using. If it incline to remain in undissolved masses, more benzine must be added; but if too thin and watery it needs more rubber. A piece of solid rubber of the bulk of a walnut will make a pint, more or less, of the cement of proper consistency.

This cement dries in a few minutes, and by using three coats in the usual manner, will unite leather straps, patches, rubber soles, backs of books, etc., with exceeding firmness. It succeeds perfectly if benzine free from oil is used in making it; while chloroform is twenty times more expensive, and cannot result in a better product. X.

Boston, May 10, 1865.

Effect of Combined Steam and Air.

MESSRS. EDITORS:—The following experiments may interest your readers, and show them that there are many unknown facts about steam worthy of research and examination. I made a small steam boiler and heated it by a gas jet, so as to supply a steady and equal flow of steam through a quarter inch pipe. I also made an air pump similar to a gas receiver, by inverting a vessel over water, and conveyed the air into the pipe of the steam boiler, so that the mixed air and steam should issue from the same orifice against a light wheel, and cause it to revolve. At first air only was thrown against the wheel and the revolutions noted; next steam alone was used, and then steam and air mixed, thus:—

Inches of air per minute	43	60	83	120	150	200
Corresponding revolutions of wheel	9	13	18	27	36	45
Volumes of steam or inches per minute	432	432	432	432	432	432
Corresponding revolutions of wheel	60	60	60	60	60	60
Inches of mixed air and steam (1 and 5)	475	492	515	552	582	632
Gave this number of revolutions	73	80	91	120	165	164
The sum of those made by air and steam separately would be (2 and 4)	69	73	78	87	96	105
Showing a gain when they are mixed	1·05	1·23	1·17	1·37	1·61	1·56

Newburgh, N. Y., May 3, 1865. W.

A Water Ram Wanted.

MESSRS. EDITORS:—I wish to use brook water to operate a ram to throw spring water to my house. I remember seeing a notice in your paper a few years since of a hydraulic ram, operated by impure water to throw pure water. This is the ram for which I inquire of you. What the ordinary hydraulic ram will do I am conversant with. I think the ram alluded to was Benson's; am not sure about it. I would like to know if the ram for which I inquire has ever been successfully used. A. M. PERKINS.

West Winsted, Conn., May 16, 1865.

[It seems to us that a machine for throwing pure by the force of impure water could not with propriety be called a water ram. The thing can, of course, be done by means of water engines, or water wheels in great variety, provided there is water and fall enough in the brook to furnish the requisite power. The simplest and cheapest plan for our correspondent would probably be to attach a plain force pump to a small undershot water wheel.—EDS.

$10,000—Machine for Peeling Willow.

MESSRS. EDITORS:—Will you permit me to call the attention of inventors to a machine for which there is an urgent demand, and which has not yet been made to work satisfactorily. It is a machine to peel basket willows or osiers. Several such machines have been made, but they are either too expensive or do not work well. The man who will invent and perfect a machine for that purpose that will work right will be a public benefactor, and make his fortune at the same time. But I would warn inventors before they undertake the job that to make a good willow-peeling machine is a more difficult thing than has yet been accomplished, and no one had better undertake it unless he has an unlimited stock of patience and perseverance, and some money or credit.

If it will be any inducement to encourage inventors, I will offer *ten thousand dollars* for the patents covering the rights for the best willow peeling machine that may be got up within three years.

GEO. J. COLBY.

Waterbury, Vt., May 18, 1865.

[Mr. Colby incloses us one of the cards of his firm, which reads as follows:—Colby Brothers & Co., manufacturers of "Colby's Patent Clothes Wringer," children's carriages, cabs, cab wheels and willow ware, Waterbury, Vt.—EDS.

The Floating of Solid on Molten Metal.

MESSRS. EDITORS:—In No. 20, current volume of the SCIENTIFIC AMERICAN, appears a report of the proceedings of the Polytechnic Association upon "Metals, Melted and Solid," in which Mr. Norman Wiard observes "that every founderyman knows that if lead be mixed with molten cast iron an explosion follows." Now, according to our experience, and, we think, of all other practical founderymen, an explosion does *not* follow mixing lead with molten iron. In fact, we are now engaged in experiments upon mixing iron and lead, as "every founderyman" knows that lead is often mixed in small quantities with "dull" iron to make it flow readily. Perhaps Mr. Norman Wiard was thinking of the effects of *zinc* upon molten iron.

Again, Dr. Parmelee observes "that, if the experiment be properly and fairly tried, it will be found that solid lead or iron will always sink in the same metal melted." Our experience, and we have been experimenting "properly and fairly" over six months, proves that solid iron will *always* swim—why, we are not prepared to say, but we think because of some repulsion, electrical or otherwise, between the solid and molten iron. It cannot be because of the greater specific gravity of the molten iron, for upon cooling it becomes more dense, as the shrinking shows.

MOLDERS.

Battle Creek, Mich., May 15, 1865.

President Lincoln as an Inventor.

The Washington correspondent of the *Boston Advertiser* gives the following interesting account:—

"Occupying an ordinary and common-place position in one of the show-cases in the large hall of the Patent Office, is one little model which, in ages to come, will be prized as at once one of the most curious and one of the most sacred relics in that vast museum of unique and priceless things. This is a plain and simple model of a steamboat roughly fashioned in wood by the hand of Abraham Lincoln. It bears date in 1849, when the inventor was known simply as a successful lawyer and rising politician of Central Illinois. Neither his practice nor his politics took up so much of his time as to prevent him from giving much attention to contrivances which he hoped might be of benefit to the world and of profit to himself.

"The design of this invention is suggestive of one phase of Abraham Lincoln's early life, when he went up and down the Mississippi as a flatboatman, and became familiar with some of the dangers and inconveniences attending the navigation of the Western rivers. It is an attempt to make it an easy matter to transport vessels over shoals and snags and sawyers. The main idea is that of an apparatus resembling a noseless bellows, placed on each side of the hull of the craft just below the water line, and worked by an odd but not complicated system of ropes, valves and pulleys. When the keel of the vessel grates against the sand or obstructions, these bellows are to be filled with air, and thus buoyed up, the ship is expected to float lightly and gaily over the shoal which would otherwise have proved a serious interruption to her voyage.

"The model, which is about eighteen or twenty inches long, and has the air of having been whittled with a knife out of a shingle and a cigar box, is built without any elaboration or ornament, or any extra apparatus beyond that necessary to show the operation of buoying the steamer over the obstructions. Herein it differs from very many of the models which share with it the shelter of the immense halls of the Patent Office, and which are fashioned with wonderful nicety and exquisite finish, as if much of the labor and thought and affection of a lifetime had been devoted to their construction. This is a model of a different kind; carved as one might imagine a retired rail-splitter would whittle, strongly but not smoothly, and evidently made with a view solely to convey, by the simplest possible means, to the minds of the patent authorities, an idea of the purpose and plan of the simple invention. The label on the steamer's deck informs us that the patent was obtained—but we do not learn that the navigation of the Western rivers was revolutionized by this quaint conception. The modest little model has reposed here sixteen years—and since it found its resting place here on the shelf, the shrewd inventor has found it his task to guide the Ship of state over shoals more perilous, and obstructions more obstinate than any prophet dreamed of when Abraham Lincoln wrote his bold autograph on the prow of this miniature steamer.

"In the adjoining hall of the Patent Office rest the camp-chest, the uniform, the staff of Washington, the printing-press of Franklin, the mantle of Jackson. There hangs the Declaration of Independence. To this final and fitting resting-place, and out of its present surroundings of impractical dish-washing machines, amazing arrangements for stopping runaway horses, and original ideas for the improvement of children's rattles, we may trust this specimen of the handiwork and ingenuity of the man who saved his country and gave up his life in the fruition of the task, may presently be removed."

An engraving of Mr. Lincoln's apparatus for buoying vessels appeared in the SCIENTIFIC AMERICAN, December 1, 1860. The author's skill in buoying the great vessel of state over dangerous breakers has made his name honored throughout the whole civilized world.

Transmission of Heat Through Screens.

Bodies that are transparent to light are by no means equally so to radiant heat. This arises from two causes, which require to be carefully distinguished from each other, and which may be separately illustrated by a parallel action on the rays of light. A glass containing pure water absorbs very little light, and transmits almost all that it does not reflect; if the attempt be made to measure its transparency by ascertaining the distance at which a page printed in small type is legible when the vessel of water is interposed, and afterward, when it is removed, the difference in the two cases is hardly appreciable. If a few drops of a mixture of Indian ink and water be added, the transparency will be diminished, and the characters will be legible at a smaller distance; a further addition of ink will diminish the transparency more and more, until the letters can be no longer discerned. The light that is transmitted, however, although diminished in quantity, possesses the same character as the incident light; and a prismatic analysis shows that both consist of the same colors in the same proportion; if in this experiment indigo be substituted for Indian ink, the legibility of the page is diminished to an extent nearly equal; but the prism shows that certain of the rays have been absorbed more completely than others. Similar effects are produced with the rays of heat. There are, however, a number of substances which are almost perfectly transparent to light, viz.: among solids, glass, diamond, Iceland spar, ice, and a great number of crystals; among liquids, water, spirit of wine, ether, turpentine, and a multitude of other bodies; and among aeriform bodies, atmospheric air, and the greater number of gases. For heat, on the contrary, there is only one known solid that approaches perfect *diathermacy*, and that is rock salt; many colorless gases possess the property also in a still higher degree, but no liquid has yet been discovered which is free from absorptive action on the thermic rays.—*Prof. Miller.*

FROM a Melbourne journal, the *Australasian*, we learn that there is a silk-worm native to the Australian continent. It feeds on the leaves of the gum trees, and its silk is said to be exceedingly fine and lustrous.

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RECENT AMERICAN PATENTS.

The following are some of the most important improvements for which Letters Patent were issued from the United States Patent Office last week; the claims may be found in the official list:--

Revolving Fire-arm.—This invention consists in the employment of two or more cylinders, one behind the other, and arranged in such a manner that both are fired by one and the same lock and hammer, the charges in the front cylinder being first fired and those in the rear cylinder afterward. During the time the front cylinder is being fired both cylinders are coupled together and rotated by the action of a dog connected to the hammer in the usual manner. The caps of the front cylinder are exploded by a slide which passes over the rear cylinder, and is so shaped that it prevents the hammer coming in contact with the caps of the rear cylinder. One chamber of the front cylinder is bored clear through, and if it is desired to fire the charges of the rear cylinder, said open chamber of the front cylinder is brought in line with the barrel, and the slide is pushed forward and locked. By doing so the slide presses back the pin which couples the two cylinders together, and enters a recess, so that the front cylinder is held stationary while the rear cylinder is allowed to rotate and to be discharged in the usual manner. The ramrod is made of two parts and hinged together so that it serves for both cylinders. George H Gardner, 20 Beaver street, New York.

Clothes Wringer.—A great objection to the use of wringers for laundry purposes is the necessity which exists for altering the rollers so that they will take thick or thin goods with equal facility and squeeze them dry. Where cog wheels are used it is usual to make the teeth of them very long so that as the rollers raise they will still be in gear; in some cases only one side of the rolls is raised so that very uneven work is the result. At all times the necessity of slacking off or tightening the adjusting screw is troublesome, and should be obviated. This has been done in the device here alluded to; by a simple change of form, involving but one extra piece in the mechanism, the rolls are made to adjust themselves and always raise parallel or the same width all the way across. This does not in any way interfere with the action of the gears, which always remain in the same relation with each other and at the same depth of mesh. We regard this as a useful improvement in clothes wringers, and one that will improve the character and lessen the labor of using such machines very much. J. N. Pease, of Panama, N. Y., is the inventor.

Gentleman's Saddle.—This invention relates to an improvement in the construction of that class of gentlemen's riding saddles which have their skirts provided with projections to partially support the calves of the legs and thighs. These projections have been hitherto made by pads attached to an inner skirt or lining and covered by pig skin—a rather expensive mode of manufacture. This invention consists in forming the projections by swaging the leather skirts, whereby the labor and expense of forming the projections by pads attached to the skirts in the usual way is avoided. G. H. Mecker, Bridgeport, Conn., is the inventor.

Ventilating Mines.—This invention consists in a new mode of ventilation to be applied to mines of coal, iron or other subterranean workings, in which an exhausting fan or equivalent apparatus is to be used in connection with a system of air courses and air cut-offs, for the purpose of freeing them from noxious and dangerous airs and gases, and supplying fresh atmospheric air to the breasts and other parts of the mines. J. Lowden Beadle, Ashland, Pa., is the inventor.

Transfer Paper.

Transfer paper is prepared thus:—Make a mucilage with ½ oz. of gum tragacanth, strain, add 1 oz. of glue, and ½ oz. of gamboge. Mix French chalk, 4oz., old Paris plaster, ½ oz., starch, 1 oz.; run them through a sieve, grind with the mixed mucilage, add water to reduce to the consistence of oil, and apply it with a brush to thin sized paper. The drawing made on this prepared side of the paper is wetted at the back and placed on the stone, which is warmed to 125° F., the whole is then strongly pressed in the lithographic press, and the stone receives the impression, which may be printed from as usual. When two impressions are required, a red composition is made of wax, 2 parts, soap, 1 part, and vermillion to color, all melted in a saucepan, and ground with water to the consistence of cream. This is spread thinly on the second stone, an impression from the first stone is next applied, and the second drawing is thus made to correspond with the first exactly. If, in printing, the drawing becomes smutty, mix equal parts of water, olive oil, and oil of turpentine, shake till they froth, wet the stone, throw this froth on it, and rub it with a soft sponge. The printing ink will be dissolved, and the drawing will almost disappear, but, on rolling it, it reappears as clear as at first. When the stone is laid by for future use, a preserving ink is applied, to prevent the surface printing ink becoming too hard. Thick varnish of linseed oil, 2 parts, tallow, 4 parts, wax and Venice turpentine, of each 1 part; melt; add by degrees, lamp-black, 4 parts, mix thoroughly, and preserve in a tin case. This must be rolled on the stone each time before laying it aside for future use. When the whole of the impressions are completed, and the stones required for other drawings, two of the stones are laid face to face and ground with sand and water until the surfaces are clear. They are, finally, more or less polished with pumice stone, according to the required fineness, and are then prepared to receive other drawings.

Explosive Compound of Magnesium.

Mr. J. N. Hearder, of Plymouth, Eng., in experimenting with this new metal has discovered some explosive compounds of tremendous power and striking peculiarities. He ignited a small portion (about 20 grains) of one of these compounds during a lecture which he gave at the Plymouth Mechanics' Institute, the instantaneous and dazzling effect of which upon the audience was like that of a flash of lightning, causing the room to appear for some seconds afterwards to be enveloped in darkness, though it was at the time brilliantly lighted with gas. On causing two bars of magnesium to form the terminals of a powerful voltaic battery, which was prepared to exhibit the electric light, a most intense combustion ensued, one of the bars speedily became red hot, entered into ebullition, and then burnt spontaneously so furiously that it became necessary to plunge it into water to prevent its falling on the platform. In this process portions of the burning metal detached themselves, and floated blazing on the surface of the water, decomposing it after the manner of potassium, and liberating hydrogen, which also burned. The experiment had never been tried before, and the result possesses much scientific interest.

Tracing Paper.

Open a quire of double crown tissue paper, and brush the first sheet with a mixture of mastic varnish and oil of turpentine, equal parts; proceed with each sheet similarly, and dry them on lines by hanging them up singly. As the process goes on, the under sheets absorb a portion of the varnish, and require less than if single sheets were brushed separately The inventor of this varnish for tracing paper received a medal and premium from the Royal Society. It leaves the paper quite light and transparent, it may readily be written on, and drawings traced with a pen are permanently visible. Used by learners to draw out lines. The paper is placed on the drawing, which is clearly seen, and an outline is made taking care to hold the tracing paper steady. In this way elaborate drawings are easily copied.

Test papers are prepared by dipping unsized sheets into a solution or infusion of the test. The substances used are Brazil wood, Buckthorn, acetate and diacetate of lead, cherry juice, dahlia leaves, elderberry, litmus, mallow flower, protosulphate of iron, starch, turmeric, indigo, cabbage, iodide of potassium, manganese, rhubarb, etc. They are used to distinguish acids, alkalies, poisons, gases, etc.

Court-plaster should be thoroughly soaked on both sides before it is applied, and should be pressed on with a soft, dry cloth; then it will adhere so firmly that washing with soap and water will hardly remove it.

MISCELLANEOUS SUMMARY.

Melon Bugs.—Charles Thompson of St. Albans, Vt., says:—"To prevent the ravage of the melon bug, it is only necessary to place a box, without top or bottom, around each hill of plants. The bug will fly against the box, and fall down on the outside of it, and if it be well bedded in the earth, so that no entrance can be found beneath it, the plants will be secure. It is the practice of some to cover the top of the box with muslin, but this is altogether needless."

[This may do when the vines are just up, but how will it answer when they are ten feet long?—Eds.

Torpedoes Resembling Coal.—A Mr. Ripley, of Rutland, Vermont, has in his possession an ingeniously contrived torpedo, made to exactly resemble a large lump of coal. This was the artful contrivance employed with much success by the rebels on the Mississippi, and it is suspected that the awful disaster to the *Sultana* was accomplished by one of these diabolical things. The one in possession of Mr. Ripley was sent to him from Richmond by his son, Gen. Ripley, and was found in the private cabinet of Jeff Davis after his flight from the city.

One of the signs of returning peace was brought to our notice recently in the case of an inventor in Richmond applying for a patent through the Scientific American Patent Agency. As fast as the territory of the United States is reclaimed, and the flag reinstated, we receive intimations that our friends have not forgotten us. It is gratifying to notice that inventors generally have been true to the Union. Those who deserted the cause conferred but little luster upon the one they espoused.

The Linen Company, at Willimantic, have introduced a machine which greatly facilitates the manufacture of spools. The turning is done by a single process. The timber for them is birch, comes from Maine, is sawed into square pieces, which are supplied to the machine and come out perfectly finished spools. It is curious that the wood can be brought from Maine at less expense than it can be obtained there.—*Commercial Bulletin.*

[This is certainly curious.—Eds.

Experiment with Steel Shot.—Some experiments recently tried in England to determine the value of steel shot as projectiles resulted as follows:—The shot were fired at 5½-inch rolled plates, supplied by the Millwall Iron Company; the plates were fixed vertically, without backing, against a wooden frame. The greatest amount of penetration was obtained by Sanderson Brothers & Co., viz., 3.275 inches. The shot were 8 inches in diameter.

So successfully does the money-order office work that it is to be greatly enlarged. One hundred and thirty-nine offices were established on the first of November last. On the first of June two hundred and eighty more will be established. The amount of money orders issued last quarter was $588,462 24, on which Government received about $5,000. There are about $40,000 constantly lying in the hands of postmasters, subject to call.

BOOKS AND PUBLICATIONS.

Derrick and Drill, arranged and edited by the author of "Ten Acres Enough," is a small book of 276 pages, published by James Miller, 522 Broadway, New York, (successor to C. S. Francis & Co.) It is a compilation of facts and speculations in relation to petroleum, presented in a very interesting and readable form.

Our Late President.—Messrs. J. Gurney & Son, the celebrated photographic artists, No. 707 Broadway, have just issued a large-size and very finely executed photograph of the late President Lincoln. The likeness is admirable, and if any of our readers desire to possess a good picture of the great and good man, we can recommend the picture of Messrs. Gurney.

SPECIAL NOTICE.

Isaac M. Singer, Yonkers, N. Y., has petitioned for the extension of a patent granted to him on the 12th day of August, 1851, for an improvement in sewing machines.

Parties wishing to oppose the above extension must appear and show cause on the 24th day of July next, at 12 o'clock, M., when the petition will be heard.

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Improved Water Wheel.

These engravings represent an improved water wheel, for which the inventor claims special advantages. Fig. 1 shows the wheel and case, Fig. 2 the wheel isolated, or by itself, and Fig. 3 a section. The general configuration and plan of the several principal parts being thus snown, we give the inventor's description and claim for novelty. He says:—

"I claim for my wheel a greater percentage of the water power, and freer escape after it has been used. To this end the invention consists in having the scroll and buckets arranged angularly in such a manner that the water will act upon the wheel nearer the edge or periphery than hitherto. By the peculiar construction of the wheel and the water acting upon or near the periphery of the same, it works under or with a greater leverage than is usual in wheels, which, of course, increases the power or percentage to the increased amount of leverage. By this arrangement, also, the water is allowed to escape more readily from the wheel, owing to its centrifugal force, and having a tendency to pass in the direction allowed it by the buckets, hence the water will not be restricted or retarded in its flow or passage through the wheel, consequently loses no power from that cause. Another advantage of the wheel is, that it can be placed in any position and work equally well." The whole patent or any territory is for sale. It was patented through the Scientific American Patent Agency on the 14th of February, 1865, by Joseph F. Letellier, whom address for further information at Grand Rapids, Mich.

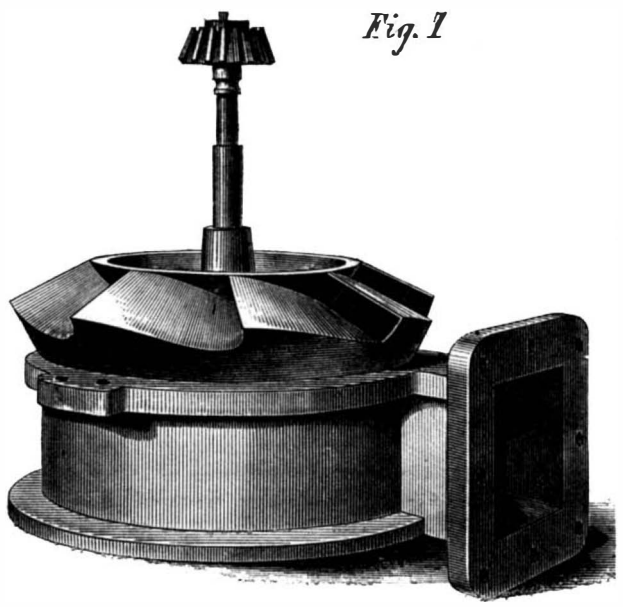


Fig. 1

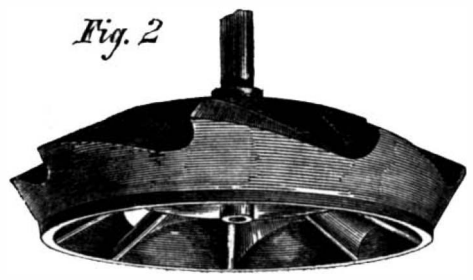


Fig. 2

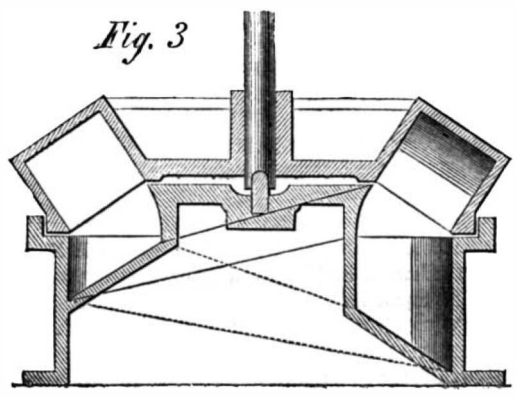


Fig. 3

LETELLIER'S WATER WHEEL.

Knowlton's Ship-timber Sawing Machine.

One of the best machines used in ship construction that has come to our notice for a long time is the timber sawing machine of J. L. Knowlton, of Philadelphia, an engraving of which may be found on page 128, Vol. X., Scientific American. It is applicable for sawing either heavy or light timbers to curves or irregular forms. It is coming into general use in our largest and best yards.

In a recent notice of Mr. Lynn's shipyard, in Philadelphia, we inadvertently alluded to him as the inventor of the machinery used in his yard. We should have stated that the improved sawing machinery used by Mr. Lynn was the invention of Mr. Knowlton; it was the latter gentleman we had in mind when stating that we have had at our office a number of his inventions, all of which possessed ingenuity and utility.

DEATH OF WILLIAM SEWELL.

It is with regret at the loss of an able, skillful and thinking member of the engineering profession that we announce the decease of Mr. William Sewell.

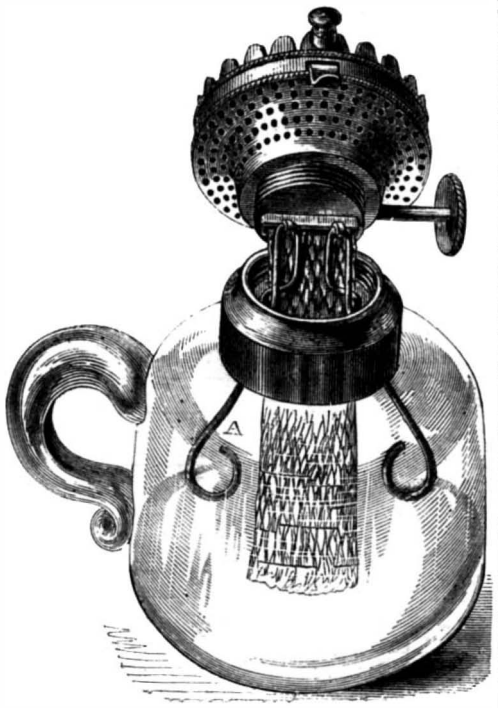
This gentleman died at his residence in Lexington avenue, this city, on the morning of the 12th inst. He was at one period Chief Engineer of the Navy, and during the retention of his office, and since, has been foremost in suggesting and applying improvements to steam machinery. Mr. Sewell is widely known through his surface condenser, the only apparatus of the kind in *general* use throughout the country; in making this statement we are not ignorant of the fact that many others exist and are in daily use. The combined hand and steam pump is a recent invention of Mr. Sewell, and is highly spoken of by engineers.

Mr. Sewell's ingenuity was not so much manifested in machines as in the faculty he possessed of suggesting improvements in plans and systems already in force. Conservative in his views he yet willingly accepted anything that seemed really advantageous.

Mr. Sewell was quiet and unobtrusive in his manner and won the respect and esteem of his associates, who will long remember him with feelings of regard.

MOORE & COLE'S SUSPENDER FOR LAMPS.

The present mode of filling kerosene lamps is attended with many inconveniences. In unscrewing



the burner it is necessary to hold it in a position to pour the oil into the lamp, and at the same time prevent the wick from besmearing the same. The desired end is successfully accomplished by the accompanying device. The invention consists in providing a spring, A, hinged at the lower portion of the burner, so that when it is necessary to fill the lamp the burner is unscrewed from the same and turned over, as shown in the engraving. The spring, A, holds the burner on the lamp and at the same time draws the wick to the opposite side of the neck of the lamp, thereby leaving an ample opening for the admission of oil. The spring is also sufficiently flexible or elastic that it may be withdrawn from the lamp if necessary and again replaced.

This novel and simple invention was patented on the 7th of March, 1865, and further information may be had by addressing the patentees, Moore & Cole, Northville, Fulton Co., N. Y.

Launch of a Huge English Iron-clad.

The iron ram frigate *Bellerophon* was safely floated out of the dock at Chatham, in the presence of a large concourse of spectators. She was laid down in April, 1864, on lines supplied from the Comptroller's office, for a frigate of 14 guns, 4,246 tuns, and 1,000-horse power. When the ship left the dock the tide had risen to 20 feet 4 inches, which was a remarkable high flow, and the *Bellerophon* was very quickly along the sheer hulk, where she is to remain for one month to get her boilers, engine, gear, and masts on board. At present she is almost a skeleton, and her armor-plating fixed is only in the center of midships of her starboard and larboard sides. The plates are said to be of the best rolled iron, each plate being 16 feet in length, and 6 inches in thickness, weighing nearly seven tuns; the inner skin plating is only 1½ inch in thickness, which is about an inch in excess of the inner plates of the *Achilles;* the latter being worked to 9-16th of an inch in thickness. The teak timber backing to which the armor plates are attached is only 10 inches in thickness, and they are well secured by 2¼-inch ordinary bolts. It will be some months before she is completely finished. She has a projecting ram of about 18 feet; her present weight is 3,085 tuns; she has been built at the rate of 60 tuns of material per week. On the ship being placed at her moorings opposite the dockyard, her draught of water was found to be 9 feet 6 inches forward and 17 feet aft. Her dimensions are as follows:—Length between perpendiculars, 300 feet; length of keel for tunnage, 254 feet 6¾ inches; extreme breadth, 56 feet; depth of hold, 17 feet 3 inches; burden in tuns, 4,246.

Trial of a Dummy Engine.—A dummy engine inclosed in a compartment of an elegant car, filling a space not much larger than that of the platform occupied by the driver of horse cars, made a trial trip in Chelsea, recently, on the Lynn and Boston Horse Railway. The trip was highly successful. The engine was built at an expense of $6,000, and weighs five tuns. The Lynn and Boston Horse Railway intend to use the dummies on the journey to Lynn.

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NEW YORK, SATURDAY, MAY 27, 1865.

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THE DIFFERENCE BETWEEN NATIONAL BANKS AND STATE BANKS.

A bank is an association of individuals who have clubbed a portion of their capital in a joint-stock company, in order to loan it with less liability of losing the whole.

When such an association has provided itself with strong iron boxes and stone vaults, for keeping the money it has on hand safely, various individuals in the community who chance to have sums of money in their possession which they do not wish to use at present, take them to the bank for safe keeping. Experience has shown that there is no danger that all of these deposits will be called for at the same time, and that consequently the banks may venture to loan a portion of them and pocket the interest.

Experience has also shown that when a bank has established its credit, its own notes will pass from hand to hand in the community as money. Banks accordingly exchange their notes not on interest for the notes of business men drawing interest.

These are the two principal sources of profit to banks—the interest which they obtain by loaning their deposits and their circulation. If a bank be shrewdly managed these profits will usually more than pay the rents, salaries, and other expenses of the establishment. Many banks while loaning their means at 6 per cent interest have divided more than 8 per cent to their stockholders.

The temptation to make these profits as large as possible frequently seduces directors of banks to loan a larger portion of their deposits than is prudent, and if circumstances cause a more than usual demand for payment by depositors, the banks find themselves unable to comply, and are forced to suspend payment. The banks having paid away their cash on hand to depositors are without means to face the call for payments of their own notes in circulation, and thus the community finds a large portion of its money suddenly changed from notes worth their amount in gold into a mass of irredeemable paper.

The great loss and inconvenience resulting from the frequent failure of banks to pay their own notes have led to many attempts by the legislatures of different States to provide a remedy for the evil. The plan finally adopted by the State of New York seems to be the most effectual of any yet suggested. By this plan, all banks are prohibited from issuing any notes for circulation as money until they have deposited with an officer appointed by the State the full amount of the notes and something more, in mortgages, State bonds or other valuable and saleable property. Then, if the bank fail to pay its notes, the State officer holding these securities belonging to the bank is directed to sell them immediately, and apply the proceeds to pay the notes.

The national bank law is simply the application of the New York banking law to the whole country, with a few modifications. A national bank delivers to the Treasurer of the United States a certain amount of United States bonds, for which the bank has paid. The Treasurer gives a receipt for the bonds and lays them away in a strong vault; he also delivers to the bank 90 per cent of the amount of the bonds in "national currency" notes, which the bank may loan on interest. It the bank refuse to pay any of these notes on demand, the Treasurer of the United States will pay them, and the deposited bonds belonging to the bank will be sold or canceled to an equal amount. The law also provides that these notes shall be received at par in payment of all taxes and dues to the United States except duties on imports. These provisions make the notes of the national banks the best paper currency that we have ever had, excepting the legal-tender treasury notes, which would have been a perfect currency if they had not been issued in excessive amount.

Our State banks are gradually entering upon the national system, and we think, before many months have elapsed, that the whole State banking system of the country will be based upon national securities—a result which we regard as very desirable to the community.

THE "STONEWALL."

The latest sensation in this hour of sensations is the appearance at Nassau of the rebel ram *Stonewall, alias Olinde, alias* several other titles not necessary to mention.

This vessel was designed to break up the blockade of our coast, but coming in too late for the fray has been disappointed, and will probably go back, we are sorry to say, without a battle. We regret this, for we have already so many specimens of English iron vessels in our possession built for speed that we should like to have one French ship, built for strength, so that we may see what their claims to invulnerability are based upon.

In another part of this journal we have reprinted a graphic and clear description of this vessel, from a correspondent of the *Herald*. It will be seen in this account that the ram is armed with 70-pounders, and a 300-pounder. As we are not supposed to run away from the fearful appearance of the exterior, the guns and armor are all we need take into account.

"What man has done man may do," and we have already encountered an enemy much more formidable than this two-keeled, two-wheeled nondescript, and vanquished it with ease, so that, not unreasonably, we may hope to repeat the performance when occasion serves.

The *Stonewall* has stationary turrets of oak, 18 inches thick, plated with iron two inches thick. To this remarkably stanch structure the safe keeping of the crew, guns and machinery for working them, is committed. Of the side armor it is not necessary to speak; let it be ten feet thick if necessary, there is no occasion to waste powder in attacking or ink in describing it, when the vulnerable points are placed above it.

The *Atlanta* rebel iron-clad had 4½-inch iron plating, backed with two feet of Georgia pine, and the *Tennessee* had 5-inch plates, backed with two feet of oak. Both of these vessels were attacked by monitors with 15-inch guns, and surrendered to them, only after being compelled to by having their sides broken in. The rebel vessels were armed with heavy rifles 7⅛-inch bore, re-enforced by wrought-iron bands, but failed to injure our iron-clad vessels in the slightest degree, while the 15-inch shot burst in the sides of the *Tennessee* and *Atlanta* when they struck her fairly.

These are simple facts that it may be well to bear in mind when the ram fever prevails. We do not commit the folly of underrating an adversary; we have fought and conquered better ships with heavier metal, both on the broadside and thrown from it, than the *Stonewall*, and we are not to be appalled by the presence of an inferior ship or the boasts of her officers. They know only too well that prudence is the better part of valor and will never come within range of the 15-inch guns. If they do they will be as certainly smashed as thunder is to follow lightning.

INEFFICIENT MACHINERY.

Twenty years ago, when machinery was just beginning to be appreciated, and mobs having ceased to destroy, learned to respect it for its usefulness, any tool that would do more than a man could was to be commended; but in a quarter of a century we have made some progress in the arts, and those machines which were once economical are no longer so.

We see clanking, rattling, jerking chains instead of screws, on iron planers; miserable feed arrangements and worse accommodations for tool holders in lathes; chucks that are good for nothing but to jam men's fingers, and have to be taken to pieces for every new job; bolt cutters that cut bad threads and strip half of them at that; taps of no pitch and no shape to the thread; nuts that are not alike on any two sides and that no one wrench will fit; and many other minor matters unnecessary to detail at greater length, but all vexatious, and obstacles in the way of improvement.

That these simple things exercise a great influence on the profits of any concern is not to be denied, for to do a given amount of work either greater motive power is consumed or the proprietor and all hands must work harder. We believe that it would be true economy for shops that own a stock of poor and old-fashioned machinery to close it out immediately for what it will bring, and stock the works with the newest and most approved kinds. There is to be a busy time shortly, and shops ill fitted for work will suffer —"the weakest must go to the wall."

WATER AS FUEL.

On Monday evening, May 15th, the Association for the Advancement of Science and Art held a meeting at Room 24, Cooper Institute, and after some formal business, the President, Dr. John H. Griscom, read a paper on Water as Fuel. It was by far the ablest and most intelligent argument yet presented in favor of Hagan's stove.

It will be remembered that this stove has a vessel of water suspended in the upper portion, and as the water is evaporated the steam is conveyed downward in a pipe to the fire-box, where it is superheated and then blown directly among the burning coals. It is claimed that the steam is decomposed, giving up its oxygen to the coals, and that the hydrogen thus set free is then burned by the atmospheric air which enters through the grate, causing a great increase of heat.

The chemical changes may be illustrated by a few simple figures. The portion of anthracite coal that burns is carbon. Let a single atom of carbon be represented by a star (*) and let us follow it through the stove. Atmospheric air consists of one-fifth oxygen and four-fifths nitrogen gas, mechanically mingled. The nitrogen performs no part in combustion, the burning being the chemical combination of the oxygen with the carbon. Let an atom of oxygen be represented by a small o. When the air passes through the grate, two atoms of oxygen combined with one of carbon, o*o, to form an atom of carbonic acid—the heat of the fire being developed in this act of combination.

An atom of water is formed by the combination of one atom of oxygen with one of hydrogen. As the atom of hydrogen, though only one-eighth as heavy as the atom of oxygen, is twice as large, let that be represented by a large O, and the atom of the water by Oo.

Now, if a jet of superheated steam be thrown upon a bed of coals at a sufficiently intense heat, the steam will be decomposed, each atom of carbon combining with the two atoms of oxygen in two atoms of water, and setting free the two atoms of hydrogen.

Then if the atoms of hydrogen thus set free are brought in contact with two atoms of the oxygen of the atmosphere, they enter into combination with them, forming again two atoms of water.

When coal is burned directly by the atmosphere, each atom of carbon, (*) combines with two atoms (oo) of the oxygen of the air, forming an atom (o*o) of carbonic acid. But if the atom of carbon takes

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its two atoms of oxygen (oo) from two atoms of water, (Oo Oo) it sets free two atoms of hydrogen, (OO) which, in burning, combine with two atoms of atmospheric oxygen to form two atoms of water again. Thus the oxygen taken from the water by the carbon is restored from the atmosphere, producing the same effect on the carbon and on the air as if the water were not employed, while just as much water as is decomposed is formed again before it leaves the stove. The burning of a pound of hydrogen generates a larger quantity of heat than the burning of a pound of any other substance known.

The claim for Hagan's stove is that it furnishes hydrogen, the most efficient of all combustibles, and thus causes a great increase in the production of heat. The reply is, that it costs just as much heat, or other equivalent force, to separate the two atoms—oxygen and hydrogen in one atom of water—as is developed by their recombination when the hydrogen is burned.

The point to which we would especially direct attention is, that the employment of water does not vary the original substances, or the final products. The water goes in as water and comes out as water. In both cases, when water is employed and when it is not, the oxygen and carbon enter the stove as separate elements, and emerge as carbonic acid.

To suppose that we can increase the production of heat by a variation in chemical changes which start from the same substances and result in the same products, would be regarded by all who believe in the conservation of force, as a proposition perfectly analogous to perpetual motion—as an attempt to get out of something more than there is in it.

BURNING WATER.

The following is the substance of Prof. Seely's remarks in reply to Dr. Griscom's paper on "Water as Fuel," which was read before the Association for the Advancement of Science and Art at its last meeting:—

Mr. President :—There is no substance more important than fuel; it is of the first necessity in all arts. Any discovery or invention that would effect an economy in fuel would be of the very highest value. If any one can actually accomplish a saving of one per cent in the general use of fuel, the community will very willingly pay him a large fortune for it. If Hagan's stove produces, as is claimed, a given heat with twenty or thirty per cent less fuel than other stoves, I should like one-millionth part of the patent.

The idea of decomposing water, and then generating heat by recombining the elements—burning the hydrogen—is not new. It has come up at brief intervals in some modified form for the last forty years. I have been repeatedly assured that some one of these plans actually effected a saving of fifty, or thirty, or twenty per cent of the fuel, but in every case that I have examined the observations were not thoroughly made. It is not enough to say that when he used one of these stoves he consumed a tun of coal less than he did the previous winter, when he used some other kind of stove. Our senses are very poor measures of temperature; we are not thermometers.

There is no doubt that hydrogen is an excellent fuel, but the important point that was not discussed in the admirable paper which has been read is the cost of decomposing the water. Water may be decomposed by heat, but it is deducible from general laws, and has been ascertained by direct experiment, that just as much heat is consumed in decomposing it as is generated by the recombination of its elements. See how absurd it would be to suppose otherwise. If we had a jet of steam coming in at a point where it was decomposed, and then by carrying the two separated gases to a second point and recombining them we could produce more heat than was expended in their separation, we might accumulate heat, and from a single pint of water in time obtain sufficient heat to supply the whole world. It is a scheme for perpetual motion.

Being thus satisfied in my own mind that there is no gain of heat by using water as in Hagan's stove, I am satisfied that there is a loss. All heat that is put into the water, and is not recovered from it, is wasted. Water is the most efficient substance that can be employed for carrying away heat. To raise the temperature of a pound of it a given number of degrees—requires four times as many units of heat as to raise the temperature of a pound of air the same extent; and then to turn a pound of it into steam will require 1,000 units heat more—as much as would heat a pound of water, were it not evaporated, 1,000 degrees—or a pound of air, which is fifteen cubic feet, 4,000 degrees, and air is usually warmed in our dwellings only twenty or thirty degrees.

What evidence is there that in this stove there is any decomposition of water? Some time since there was a water-gas apparatus in operation in Boston, and I went there to examine it. Superheated steam was thrown upon burning coke, and afterward mixed with tar gas; and it was supposed that the water was decomposed, furnishing hydrogen to the gas. The parties held perfect faith in the scheme, and the apparatus was put wholly under my direction to examine and test. I avoided introducing the tar from which the gas was being made, and allowed the steam after passing over the hot coke to enter the gas pipe alone. It was immediately apparent that at the temperature at which the work had been going on decomposition of the water did not take place. In fact, there was not a drop of water decomposed until the coke was raised to a white glowing heat—so intense indeed as to damage the apparatus. When I saw Hagan's stove in operation, the temperature of the coal was not sufficiently high to effect the decomposition of water.

It may be said that I am prejudiced. Admit it if you please; my thermometers are not prejudiced; my figures are not prejudiced. Give me a chance. Let the heat produced by this apparatus be carefully measured. If there is an economy of heat in the decomposition of water and the recombination of its elements, I will not only admit it—I will proclaim it as the greatest and most valuable chemical discovery of the century—indeed the most wonderful discovery ever made.

Change of Plan in English Iron-clads.

The discussion reprinted below recently took place in Parliament, and set forth, as will be seen, a change of plan in some of the English iron-clads to be built:—

Lord C. Paget said that he had stated, on introducing the navy estimates, that they were going to build vessels on the twin-screw principle, about that tunnage, of considerable speed, of light draught of water, plated at the water line with 6 inches of iron on 10 inches of wood, besides an inner skin of ¾ inch of iron, which they hoped would be able to carry eight 12-tun guns. Assuming that they succeeded in doing that, he wanted to know whether anything that foreign governments were about to build offered a prospect of greater efficiency?

Mr. Laird—What is the speed in such vessels?

Lord C. Paget was of opinion that it would be about twelve knots, but if he was mistaken he should have an opportunity of correcting that mistake. It was said that the *Alabama* was built for the particular purpose of being a sea-goer, and that speed was not of so much importance.

Mr. Laird—I beg to correct the noble lord. I said she had sea-going qualities together with sailing qualities.

Lord C. Paget said that was just what the Admiralty proposed to do with their cruisers. The duty of those ships was to go to foreign ports, and it was undoubtedly of great importance that they should have sailing qualities as well as sea-going qualities. They proposed to arm the *Amazon* class with 200-pounder 6¼-tun rifled guns, and in all the ships they were building they were giving heavier guns and fewer of them. They would carry four guns on a broadside, which would throw 900 pounds of iron, whereas the old ships, although they carried more guns, threw only 296 pounds. They were always hearing of what foreign nations were doing, but they had not yet found that foreign nations were able to do more than themselves.

The National Bereavement.

Our European exchanges come to us filled with expressions of profound grief at the death of President Lincoln. The London *Star*, in its notices of the various meetings of condolence held in the principal towns of England, says:—"Throughout the whole of yesterday the front of the extensive premises of Mr. Charles Pomeroy Button, American merchant, of Cheapside, was draped with black cloth, edged one inch deep with white. Black cloth also depended from the facia, above which were crossed the American flags, covered with black crape. Business was entirely suspended, and every article in the interior of the shop covered with the same somber colored drapings. Among the latest demonstrations was one by the workingmen of London, who, in addition to resolutions of condolence, adopted one rejoicing at the recent Union successes and the destruction of slavery."

RECENT ENGLISH PATENTS.

WORKING THE SLIDE VALVES OF STEAM AND OTHER ENGINES.

This invention consists in using but one eccentric, fast to the shaft, to work the slide valve of an ordinary steam or other engine, so that the engine will move backwards or forwards while the necessary lap and lead for expansion is preserved.

PREVENTING LEAKAGE OF THE TUBES OF TUBULAR BOILERS AND OTHER TUBULAR STEAM AND WATER APPARATUS.

This invention consists in the employment of short split tubes or rings which are cylindrical outside and conical on the inside. The external diameter of these short tubes corresponds with the interior of the tubes of the boiler or other apparatus, but the short tubes are yet capable of being readily inserted into the ends of such tubes. The longitudinal splitting of the short tubes or rings is in an inclined direction through the metal, so that the edges overlap each other, and so that the split will not be opened when a tube or ring is somewhat expanded to cause it to fit closely within the end of a boiler or other tube. In addition to these short split tubes, other short tubes are used, which are cylindrical inside and conical out, and they have each a flange at their outer ends. These tubes fit within the split tubes at their inner end, and their flanges extend over the outer ends of the tubular flues or other tubes fixed in the plate. In order to stop the leak of a tubular flue or other tube fixed in a tube plate, a screw bolt and screw nut are used. On the end of the screw bolt is a cross bar or instrument pin jointed to the screw bolt. This cross head or instrument can pass through the short tube introduced into the end of a tubular flue when in one position, and then when opened out the ends of the cross heads come against the end of the split tube. There is a second cross bar or cross head or plate used which rests against the outer surface of the flanged end of the second or inner short tube above described. In using this apparatus the two short tubes are to be introduced with the screw bolt into the end of the tube, and then the screw nut is to be turned till the split tube is drawn upon the inner short tube, and has by it been caused to expand to the requisite extent, when the screw bolt, nut, and cross heads are to be removed.

MACHINERY FOR PROPELLING.

This invention relates to double-action steam propellers, the steam being produced by evaporation, or by the combustion of a gas capable of producing it without condensation, and differing from other motive propellers either terrestrial, marine, or aerial—first, on account of the draught from the furnace not being produced by steam injection, but being the result of the efflux of some part of the air which the vehicle containing the motive power rapidly displaces or compresses by its progressive forward movement. This air is introduced into the furnace through openings properly prepared on the fore part of a closed ash-box, set under the grate, and, in case of need, on some part of the fire-box. Secondly, on account of the steam being capable of being disposed of after having worked as motive power to ordinary machinery, by being conducted out by passing through the chimney stack up to its orifice, more or less bent backwards by means of a tube entirely closed, terminating outside with one or several orifices made in a direction exactly opposite to the movement of the apparatus, and so prepared as to increase the forward impulse produced by the mechanism by means of the reaction still sufficiently energetic which the half-distended steam produces when coupling its condensation with the atmosphere. This propeller will not only give to boats and locomotives on railways a greater speed without increased expense, but will

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admit of easily transforming engines such as those used for agricultural and other purposes, by the addition of plate board and tender, into small locomotives capable of running on public roads or streets, for moving every kind of vehicle, for ascending mountains however steep, for working agricultural and other implements, and for other purposes.

APPARATUS FOR HEATING STEAM BOILERS.

This invention consists in communicating the heat to the boiler for raising steam through the medium of a substance which is fluid at the working temperature, but which does not readily evaporate or become decomposed, while it is capable of supplying the necessary heat without being so hot as to injure the boiler shell. Lead is a suitable and convenient substance for the purpose in view, and in carrying out the invention the patentee applies that substance between the fire and the boiler proper, putting it in a bath jacket or shell of a form adapted to whatever class of boiler may be used.

A CURIOUS CLOCK.

Some time since there was exhibited at a watchmaker's window in Montgomery street, in San Francisco, a clock, in which, at first sight, there seemed no possible means of making the hand revolve. The dial was a simple plate of transparent glass with a small, smooth pin in the center, which passed through a plain hole in the hand. The clock had but one hand—an hour hand light and slender—and upon the short end of this was formed a small box of thin metal. There was no contact of the hand with the dial except at the pivot, and there was nothing touching the pivot except the hand and the glass in which it was embedded, yet the piece kept perfect time. This clock was a mechanical puzzle that attracted a constant group around the window.

We have never received any explanation of the construction of this puzzle, but imagine that the works were in the small box on the short end of the hand. Suppose within this box watch-work driven by a spring and regulated by a balance wheel, so that it would cause a little hand to revolve once in twelve hours, in a plane parallel with the dial. Then let this little hand carry a small weight say a pistol bullet on its end, and let the large hand be made very light, and be so nicely poised that when the weight was furthest from the fulcrum, it would bring the short end of the large hand down, causing the long end to point directly upward and indicate 12 o'clock; but when the weight was nearest the fulcrum the long end would overbalance and point downward to 6 o'clock. Then as the weight revolved it would cause the hand to balance in the several positions around the dial, depending upon the time of day as kept by the watch-work within the box.

If this explanation is correct, the hand might be laid away in a drawer, and on taking it out at any time and slipping it upon the pivot, it would swing to the exact hour of the day.

Device to Prevent Candles from Guttering.

An English journal thus remarks of a new invention for preventing candles from guttering:—

"Many contrivances have been brought out at one time or another to prevent candles from guttering when being carried about or standing in a draught.

"For the information of the trade, we may say that this article is nicely finished in polished brass and glass and is retailed at the small price of one shilling English money. It most effectually prevents the candle from guttering; while the billiancy of the flame does not suffer from want of air, a good supply of which is secured by perforations in the lower extremity of the Nozzolette; while the protector is kept free from grease by an occasional dip in scalding water, the candlestick requires less trouble to clean it then when the grease is allowed to run into the crevices."

THE entire length of the railroad between Vera Cruz and Mexico will be 315 miles; the highest summit level, 8,300 feet above the sea, being double the hight of any other railroad in the world; it will have an incline of 23 miles, and a grade of 212 feet per mile, on which the curves have a radius of 500 feet. There is one bridge to be built 290 feet high, beside several tunnels, etc.

ISSUED FROM THE UNITED STATES PATENT-OFFICE FOR THE WEEK ENDING MAY 16, 1865.

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☞ Pamphlets containing the Patent Laws and full particulars of the mode of applying for Letters Patent, specifying size of model required and much other information useful to inventors, may be had gratis by addressing MUNN & CO., Publishers of the SCIENTIFIC AMERICAN, New York.

47,688.—Metallic Cartridge.—Ethan Allen, Worcester, Mass.:

I claim, First, Making the base of the cartridge shell with an opening and a flange, b, in combination with grooving out the base, B, whereby the body of the cap, as well as the flange which contains the fulminating powder, are well supported, and a sure explosion insured, substantially as described.

Second, The combination with the case, A, of a base, B, provided with three flanges, a b and c.

47,689.—Making Sheet-metal Boxes.—George Anderson, Salem, Oregon:

I claim the mold, A, in combination with the form, C, the latter being composed of the plates, a f f g g, connected by hinges, e h, and the mold being attached to the plate, a, of C, by a hinge, B, all arranged substantially as and for the purpose set forth.

Second, I also claim the spring, D, in the described combination, with the hinged block, A, for raising the same automatically, as explained.

Third, I further claim the arms, k k, in the described combination, with the hinged plates, F F, for the purpose specified.

[This invention relates to a new and improved machine for constructing or forming the bodies of sheet-metal boxes, whereby the work may be done rapidly and in perfect manner.]

47,690.—Snap Hook.—Jonathan Bailey, East Troy, Wis.:

I claim the combination of the sliding bolt with the snap hook and spiral spring coiled around the bolt, as described, for the purposes set forth.

47,691.—Harvester.—Stephen S. Bartlett, Providence, R. I.:

I claim the combination with the shoe, D, of the pivoted spring brace, E, fixed spring brace, G, lever, H, and rack, f, all arranged in relation to the main frame, as and for the purposes described.

47,692.—Mowing Machine.—Stephen S. Bartlett, Providence, R. I.:

I claim the use of the socket, f, cast with the pole plate, in combination with the adjustable standard, K, for supporting and adjusting the seat, substantially as herein described.

47,693.—Cultivator.—Wm. E. Bates, Elmore, Ill.:

I claim the swinging levers, Q Q, connected substantially as described, with the forward and rear shovel standards, which are pivoted in such relation to the frame and laterally-moving mechanism that the two shovels thus connected are caused by the action of the treadle to approach to or recede from the corn in concert, as described and represented.

47,694.—Ventilation of Mines.—J. Lowden Beadle, Ashland, Pa.:

I claim the use of the fan as an exhauster of the impurities of mines, or for the purpose of creating a partial vacuum in the working parts thereof, in combination with the system of air courses herein represented and described.

47,695.—Crutch.—August Bickel, Philadelphia, Pa.:

I claim the employment of a removable buffer, D, in combination with the spur, B, fixed rigidly in the lower part of the crutch staff, A, as described, the said buffer being constructed so as to be applicable over the spur, in the manner described and for the purpose specified.

I also claim the employment of the removable guard thimble, C, in combination with the spur socket, E, on the lower end of the crutch staff, A, as described, the same being constructed so as to be applicable, in the manner and for the purpose set forth.

47,696.—Constructing Boots and Shoes.—Lyman R. Blake, Boston, Mass.:

I claim the new process of constructing a shoe, substantially as set forth.

47,697.—Machine for Measuring and Counting Shingles.—M. Bonney, Mantua, Ohio:

I claim as my improvement the measuring wheel, F, and recording index, I K, in combination with the slide, G, hooks m, and c c, dog, g, and adjustable arms, D D, arranged and operating as and for the purpose set forth.

47,698.—Clothes Dryer.—Edward Bucklin, Jr., Pawtucket, R. I.:

I claim the longitudinally sliding rod, E, forming the guide for the revolving slave or swivel, D, in combination with folding arms, C, hinged braces, b, ring, B, and post, A, constructed and operating substantially as and for the purpose set forth.

47,699.—Cultivator.—James Brewer, Albany, N. Y.:

First, I claim securing the central pair of cultivator standards to the plow beams by means of swivel hinges, for the purpose of admitting them to be moved in a vertical as well as in a lateral direction, substantially as and for the purpose specified.

Second, In combination with the laterally movable standards, O, adjustable stirrups, r, substantially as and for the purposes specified.

Third, In combination with the laterally movable standards, O, the extension pieces, p, and knee stirrups, s, for the purpose of enabling the plowman to operate the plows by hand or foot, substantially as and for the purpose specified.

47,700.—Railroad Car Brake.—Ferdinand E. Canda, Chicago, Ill.:

First, I claim the belt, a, when used for distributing the pressure on the wheel, b.

Second, The combination of the eccentric wheel or cam, b, and the belt, a, with the connecting rod or chain, c.

Third, The arrangement of the shaft, m, eccentric wheel or cam, b, belt, a, and the ratchet and pall, i and h, all being arranged and operating substantially as set forth and specified.

47,701.—Device for Heating and Conveying Petroleum.—Joseph Casey, Washington, D. C.:

First, I claim the combination of steam generators, tanks, the conduit pipes and the steam pipe, and their various connections, for conveying the oil or petroleum from the wells to the receiving, gaging and heating tank, for raising it there to the proper temperature, and from thence conveying it to any required distance in the conduit pipes into other tanks, and maintaining its temperature while passing through the same, by means of the small steam pipe and its connection with the generators.

Second, I claim also the arrangement of the small steam pipe or tube within the conduit pipe, whereby the introduction of steam into the small pipe will apply and communicate such an amount of heat directly to the oil, petroleum or other substance in its flow and passage through the conduit pipe as will keep it in a fluid and flowing state, and prevent the deposit and accumulation of the sediment or residuum of the oil or petroleum in the conduit pipes, it being held in solution by and carried off with the petroleum.

47,702.—Guard Fingers for Harvesters.—Salem Copeland, Worcester, Mass.:

First, I claim coring out the rear of the guard finger, in combination with fastening the steel plate by a short rivet to secure lightness and greater uniformity in the metal thickness of the guard, in the manner herein described.

Second, Coring out the rear of the guard finger, in combination with supporting the bridge, g, by an inclined brace, h, substantially as and for the purposes described.

47,703.—Horse Hay-rake.—J. Crellin, Marshalltown, Iowa:

First, I claim the constructing of the teeth of two longitudinal parts, a a, attached to opposite sides of the rake head, A, and connected at their ends by metal tips, b, substantially as described.

Second, The oblique braces, C, attached to the draught bars, D, and arranged to rest or bear upon the cylindrical portions, c, of the rake-head, A, as set forth.

Third, The arrangement and combination of the frame, I, pivoted to the outer part of the bars, E E, and the pendant frame, G, the two frames aforesaid being connected by a rod, H, and the frame, G, connected by springs, h h, with the bars, E E, substantially as and for the purpose set forth.

[This invention relates to a new and improved horse hay-rake, and it consists in a peculiar construction of the teeth, an improvement in the draught pieces, and also in the mechanism employed for holding the rake in working position and liberating the same, in order that it may discharge its load, whereby it is believed that several advantages are obtained over the generality of rakes now in use.]

47,704.—Machine for Making Clasps from Sheet Metal.—John H. Doolittle, Ansonia, Conn.:

I claim the combination of two or more sets of rotary dies, to cut out and form the blanks, when constructed, arranged and operating substantially as described.

I also claim making the sets of dies adjustable, substantially as described, for the purpose of registering differently and adapting the machine to different kinds of work, as hereinbefore described.

I also claim making one or both sets of the above described dies adjustable in the direction of their axes, substantially as described, for the purpose of setting the dies in line, one set with another, as set forth.

I also claim the employment, in combination with the female die, b, of a sustaining and disengaging guide plate, W2, as its equivalent, substantially as and for the purposes set forth.

I also claim, in combination with the rotary dies, c d, the series of clearing figures, 4 5 6, the whole arranged and operating as specified, for the purpose set forth.

I also claim, in combination with the cutting-out dies, a b, the cleaver and chute, h, and deflector, i, arranged to operate substantially as set forth.

47,705.—Siphon Bottle.—G. W. Doty, Ravenna, Ohio:

I claim the tubes, B and D, in combination with the tube, E, and bottle, when connected and arranged substantially as described.

47,706.—Heating and Cooking Range.—Eben Edwards, Boston, Mass.:

I claim the above-described arrangement of the lateral conduits, M M, the raidating drum, K, the air-heating chamber, P, the fireplace, A, the smoke chamber, R, the oven and its flue space, G, connected with the fireplace and the radiator, as specified.

I also claim the combination of the tubes, V W, leading out of one end of the fireplace and through the air chamber with the grate shaft, the fireplace and the journal bearings, x x, at the opposite end of the fireplace, the whole being substantially as specified.

47,707.—Cylinder Pin of Revolving Fire-arm.—Wm. H. Elliot, Plattsburgh, N. Y.:

First, I claim locking the cylinder into the frame by turning the base pin upon its axis, substantially as set forth.

Second, Providing a base pin, which locks the cylinder by being turned upon its axis, with a catch, d, to prevent it from being turned back by accident, substantially as described.

47,708.—Mangle.—Thos. Farnsworth, Cleveland, Ohio:

I claim, First, The arrangement of the hanger, J, and rollers, A B, in combination with the spring, m, screws, d, and gearing, G H, substantially as and for the purpose specified.

Second, I claim the springs, P, and rollers, k, in combination with the tables, O P, and apron, R, when arranged and operating in the manner and for the purpose described.

47,709.—Sash Supporter.—William C. Fisher, Charlestown Mass.:

I claim the levers, D, and notches, d, operating substantially as described for the purpose set forth.

I also claim the presser blocks, e, when used as an adjunct to the levers, D, operating substantially as described for the purpose specified.

47,710.—Corn Huskers.—E. F. French, New York City:

I claim the employment or use of the plates or scrapers, G, in connection with the rollers, F F, arranged and applied to operate substantially as and for the purpose herein set forth.

[This invention relates to a new and improved machine for husking corn of that class in which rollers are employed to effect the object. In the original machine of this kind the corn husks are liable to wind around the rollers while the latter are stripping the husks from the ears, and thus render the machine very inefficient—a difficulty which is fully obviated by this improvement.]

47,711.—Shutter Fastening.—Jacob Frick, Philadelphia, Pa.:

I claim the plate, B, its arm, D, spindle, E, its head, g, and inclined shoulders, x x, in combination with the plate, A, and its slot, X, the whole being arranged, operated and adapted to shutters, substantially as and for the purpose herein set forth.

47,712.—Revolving Fire-arm.—George H. Gardner, New York City:

I claim, First, The employment or use of two or more cylinders presented in the same direction, one behind the other, and arranged in combination with one and the same hammer, substantially as and for the purpose set forth.

Second, The slide, I, applied in combination with the two cylinders, C C', and hammer, H, constructed and operating substantially as and for the purpose described.

Third, The spring catch, k, applied in combination with the two cylinders, C C', and slide, i, substantially as and for the purpose specified.

Fourth, Firing the charges of the rear cylinder through the front cylinder, substantially as herein specified.

Fifth, The grooved headed button, j', of the slide, i, constructed and adapted to operate as a sight, as herein explained.

47,713.—Cooking and Heating Stove.—Milton Gilmore, Morning Sun, Iowa:

I claim, First, The flues leading from fire pot, F, around ovens, O O, and between the plates forming the sides and top of the hood, to exit pipe, in connection with dampers, h h and p p, in the manner and for the purpose set forth.

Second, I claim the manner in which the fire pot is placed with grate and pit, as described.

Third, I claim the combination and arrangement with fire pot, F, of apertures, 2 and 4, and dampers, p p, substantially in the manner and for the purpose described.

Fourth, The hood of the stove constructed and arranged with the flues wholly extending around side and top, in connection with the dampers, h h, substantially in the manner and for the purposes described.

Fifth, The apertures, A', in the top of a stove, with side and top flues, and an illuminated sliding shield, D' D', in combination with the fire pot, F, in the manner and for the purpose set forth and described.

47,714.—Centrifugal Draining Machine.—Alexander N. Glass and Henry W. Bartol, Philadelphia, Pa.:

We claim, in centrifugal draining or drying machines, the thickening of the primeter of the bottom plate of the revolving cylinder, and forming a groove, recess, or shoulder therein, so that the bottom of the wire gauze cylinder may rest therein, and below the surface over which the instrument is moved in scooping out the sugar, by which means it is protected from injury, substantially as herein described.

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47,715.—Combined Implement for Detaching and Replacing the Parts of Small Arms.—Alexander Grillet, Philadelphia, Pa. Antedated May 1, 1865:

I claim, First, The two arms, A and B, hinged to each other, and provided with the studs herein described, or the equivalents to the same, the whole being arranged for acting on the main spring of the fire-arm, substantially as described.

Second, The two arms, A and B, in combination with the movable stud, b, its screw for carrying the wiper, and ball screw, and the tumbler punch, e.

Third, The combination of the two arms, A and B, with the cone and nipple wrench, a, at the end of the arm, A.

Fourth, The screw driver, C, and band punch, d, hung to a pin on the arm, B, as set forth.

47,716.—Bread Slicer.—George Hall, Morgantown, West Va.:

I claim an implement or device for cutting or slicing bread, meat, and other substances, composed of levers and links applied to or connected with a knife and bed piece, in the manner substantially as described.

[This invention consists in a peculiar arrangement of levers and links, combined with or applied to a knife, and used in connection with a bed piece, whereby the knife is made to work or operate with a drawing cut and a very simple, efficient and economical device for the purpose specified is obtained.]

47,717.—Motive Power.—William H. Hartman, Fostoria, Ohio:

I claim, First, The special arrangement of the arms, E F, and plates, I J, in combination with the pinions, m n, gear, P, and disks, H, when arranged and operating conjointly, as and for the purpose set forth.

Second, I claim the combination with the above plate, b, pendulum, C, springs, d, in combination with the wrist, a, and arms, E F, when operating conjointly, as and for the purpose set forth.

47,718.—Tire Fastener.—Robert Hatrick, Paterson, N.J.:

I claim, First, The arrangement of the felly, A, tire, C, and bolt, E, as described; that is to say, the bolt passing or extending into a notch in the edge or cheek of the tire, and extending obliquely through the felly of the wheel, thereby securing the tire in position, as hereinabove set forth.

Second, So constructing the tire, C, and the head of the bolt, E, that the latter shall be dove-tailed into the former, so as to resist lateral pressure in either direction, as set forth.

Third, The combination of the longitudinally wedge-shaped section of the bolt, E, with a wedge-shaped recess in the tire, substantially as and for the purpose set forth.

Fourth, The combination of a dove-tailed recess in the felly, A, with a dove-tailed recess in the tire, C, and with a head so formed upon the bolt, E, as to fit both of said recesses, substantially as and to the effect above stated.

47,719.—Ambulance.—John M. Hayward, Boston, Mass.:

I claim attaching the stretcher, C, to the saddle by means of the wedge-shaped legs, b, and corresponding sockets, a, substantially as set forth.

47,720.—Anchor Tripper.—B. H. Heitmann, Hoboken, N. J.:

I claim the anchor-tripping device above described, consisting of the rotating bar or keeper, D, with its troughs, f f, and the latches, c c, constructed and operated substantially as above set forth.

[This invention consists in certain devices for tripping the anchor of a vessel, whereby much time and labor is saved in throwing it off from the rail, it being only necessary to raise a lever which rests upon the rail in order to disengage both the shank painter and the ring-stopper at one and the same moment.]

47,721.—Blow Pipe.—Joshua Hendy, San Francisco, Cal.:

I claim the combination with the pipe, A, of the valve, F, tube, C, and elastic air chamber, D, all constructed and arranged as and for the purposes specified.

Also, the combination with the pipe, A, of the valve, F, tube, C, and elastic air chamber, D, and stop cock, H, when constructed and arranged as herein described.

47,722.—Starting Horse Railway Cars.—William Henderson, and J. W. Fowle, Boston, Mass.:

We claim the combination of the ratchet pawl, ratchet lever, foot rod and lifting spring, when arranged to operate together, substantially as set forth.

We also claim the combination of the rod, i, spring, n, rocker plate, k, and rod, l, for effecting the engagement and disengagement of the ratchet and pawl.

47,723.—Railroad Car Axle.—C. P. Hewett, Kingston, Wis.:

I claim the combination of the axles, A A, with their circumferential grooves, c c, the sleeve, B, the pins, d d, with their set screws, e e, and the lubricating orifice, f, substantially as described and represented.

[The object of this invention is to obviate friction in the running of cars over curves and over imperfect tracks. The invention consists in constructing the axle of two separate or distinct parts, connected by a sleeve, in such a manner that one part of the axle, with its wheel, may rotate independently of the other.]

47,724.—Boring Wells.—Lawrence Holmes, Paterson, N. J.:

First, I claim in a machine for drilling oil wells, or other drilling operations in which a jumping motion is given to the drill, so arranging and applying the driving wheel or other wheel or device through which power is applied to produce the jumping motion, that it rotates about a hollow shaft or axle through which the drill-rod passes, substantially as herein described.

Second, I claim the combination of the sleeve, M, or its equivalent, fitted to slide upon the drill-rod, or bar, D, or the tube, E, from which it is suspended, the gripers, L L, the shafts, I I, and the cams, K K, the whole arranged and operating substantially as herein described.

Third, I claim the employment, for lifting and jumping the drill or boring tool by means of a rope and gripers, or a tube, E, clamped to the rope but adjustable lengthwise thereon as the tool descends, substantially as herein specified.

Fourth, I claim in combination with the longitudinal groove, h, in the tube, E, from which the drill or boring tool is suspended by a rope, a pawl, i, so applied to the driving wheel, G, or other device from which the rotary motion of the tool is obtained, as to provide for the release of the said rod, bar, or tube, to allow the rope to relieve itself or be relieved of excessive twist, substantially as herein described.

Fifth, I claim the combination of the hollow, central shaft, C, internally toothed driving wheel, G, shafts, I I, pinions, J J, cams, K K, sleeve, M, or its equivalent, and gripers, L L, the whole arranged and operating substantially as and for the purpose herein specified.

Sixth, I claim the arrangement of the standard, B, the fixed hollow upright shaft, C, through which the drill-rod passes, and the driving wheel, G, substantially as herein described, whereby a clear space is left all around the said wheel to permit it to be operated by means of beams or capstan bars, as herein set forth.

47,725.—Packing Projectiles for Rifled Ordnance.—B. B. Hotchkiss, New York City:

I claim the employment of the soft disk or cushion, D, in combination with a Hotchkiss projectile and arranged to operate in connection therewith, substantially in the manner and for the purpose herein set forth.

47,726.—Movable Joint for Tables, Etc.—Henry M. House, Washington, D. C.:

I claim the combination and arrangement of the parts, which consist of the plate, A, with the mortiсed stud, B, attached, a hooked flanch, D, and a tapering key, C, the same being applicable for fastening all movable joints, in the manner described, for the purposes herein set forth.

47,727.—Boring Apparatus.—S. R. & Wm. S. Hunter Cortland, N. Y.:

We claim the combination of a boring or drilling tool, a, with the lower end of a cylinder or tube, A B, and with a detachable drilling-rod, E, for the purpose of boring and bottoming a well, when said cylinder or tubing is smaller in diameter than the upper end of the tool, a, and is made to rest thereon, substantially in the manner herein set forth.

We also claim the combination of the hand lever, G, with the frame work, M N, the drill-rod, E, and tubing, B, of our improved apparatus, arranged and constructed substantially in the manner and for the purpose herein set forth.

47,728.—Corn Planter.—William H. Hunter, Ridgefield, Ill.:

I claim, First, Adjustable slide, B, constructed, arranged and operated substantially in the manner and for the purpose described.

Second, Jointed or hinged lever, T, reel, P, and vertical standard, N, constructed and operated substantially in the manner and for the purpose set forth.

Third, The blocks or cams, L L, attached to the spokes of the wheels by set screws when said cams are made adjustable and removable in combination with the hinged lever, T, rod, P, and vertical standard, N, as specified.

47,729.—Boring Wells.—Walter Hyde, New York City:

I claim, First, The combination of the reserve rope drum, L, the sheave, J, the vibrating lever, G, and its pully, F, the upper pulley, C, the rope, D, drill stock and tripping cams, so that all the motions of the drill stock are governed through the medium of a continuous rope.

Second, I claim attaching the end of the drill stock to a continuous rope which is paid out as is required by the settling of the drill in the well in connection with devices by which the rope is swayed or retracted to give the reciprocating motion to the drill stock, and with devices by which the drill stock is withdrawn without detaching the rope or stopping the motion of the prime motor.

Third, I claim the lever, U, in combination with the plate, V, or other detail for arresting the motion of the vibrating lever.

Fourth, In connection with the subject matter of the second claim, I claim the lever, W, as a means of changing the action of the motor frame a drill, operating mechanism to a drill with drawing mechanism.

47,730.—Mop—Melvin Jinks, Danville, N. Y.:

I claim the bars, d and g, the handle, A, the sleeve, b, and the rods, C C, the whole arranged as and for the purpose herein specified.

47,731.—Fruit Jar.—Josee Johnson, New York City:

First, I claim inclosing the inner or tin can, A, within a casing, G H I J, wider than the can, A, so as to protect it from the pressure of the adjacent cans in being filled without the necessity for closing the remaining faces of the casing, all substantially as and for the purposes herein set forth.

Second, I claim the screw, D, or equivalent mechanical device in combination with a detachable and protecting case and adapted to compress the cover, C, and the can, A, firmly together and to release the same as described, substantially in the manner and for the purposes herein set forth.

Third, I claim in combination with a protected can, A, locking together the parts of the protecting envelope, by inserting the ends of the cross pieces, G and H, into channels in the parts, I and J, at a considerable distance from the ends of the latter so as to strengthen the envelope and protect the head of the thumb screw, D, or its equivalent, by the projecting ends of I and J, substantially as herein set forth.

47,732.—Flour Sifter.—W. J. Johnson, Newton, Mass.:

I claim combining with a common hoop-sieve a rotating scraper, D, actuated and guided by the shaft, E, crank, F, and bar, C, or their equivalents, substantially as and for the purpose described.

47,733.—Portable Lantern.—Henry S. Kassebaum, New York City:

I claim the folding sides, in combination with the top and bottom and handle for carrying the same; whereby I am enabled to make a cheap and portable lantern, substantially as described and for the purposes set forth.

47,734.—Window Shade.—Gibbons L. Kelty, New York City:

I claim manufacturing muslin window shades, with paper or other suitable material attached to the surface of such shade and forming the ornaments to the same, or receiving printed or embossed designs as specified.

47,735.—Hames Fastening.—W. W. Kithleman, Bloomfield, Iowa:

First, I claim the link, D, with oblique slots through or in it, in the manner and for the purpose described.

Second, the combination of the groove, d, shoulders, c, and slots or holes, c c, in the manner and for the purpose described.

Third, The loop catch, c, constructed as described for the purposes set forth.

Fourth, The combination of the hames loop catch and link, D, constructed, applied and operating, substantially as herein described.

47,736.—Horse Rake.—John Lacy, Chicago, Ill.:

First, I claim the arms, G, of the axle when provided with a projection and holes, i i, for raising or lowering the axles.

Second, The foot rack, F F and a, when supported by braces provided with holes for raising and lowering it.

Third, The combination of the foot rack, F F, braces, H H, and treadle, E, with the axle, A, all being arranged, constructed and combined substantially as set forth and specified.

47,737.—Pump.—W. Barnet Le Van, Philadelphia, Pa.:

First, I claim the plunger, B, composed of the parts, J K L M N and P, as described.

Second, The channel-way, D E, and valves, F and G, arranged in relation thereto, as drawn and described.

47,738.—Hoop Skirt.—Judah Levy, Philadelphia, Pa.:

I claim the strip, D, of steel, or other elastic material, secured to the hoop, A, by the fastenings, E, or their equivalents, and arranged in respect to the tape, B, and its loop or pole, a, as set forth for the purpose specified.

47,739.—Rag Engine for Paper Making Machinery.—Thomas Lindsay, Montville, Conn.:

I claim giving an endwise reciprocating motion to the beater of a pulping engine in addition to its usual motion, substantially as above described.

47,740.—Construction of Ordnance.—Joseph L. Lowry, Pittsburgh, Pa. Antedated April 29, 1865:

I claim forming cannon or heavy ordnance of two or more cast-iron cup-shaped shells of equal thicknesses and different qualities of iron varying in degrees of density, placed one within the other, and secured in the manner shown, the inner and longest one being of very hard iron, (to prevent cutting by the shot,) and least expansible, while the exterior and shortest one is of softer and very tough expansible cast-iron, to support the inner one and aid in resisting the explosive force of the powder.

Second, I claim forming a cavity or chamber around the vent tube so as to allow of its expansion without affecting the body of the gun.

47,741.—Spring Bolt Catch.—George M. Morris, Roxbury, Mass.:

I claim the spring bolt catch plate made with the bolt and roller recesses and having the friction roller and the extension for supporting it, the whole being arranged substantially as herein before explained.

57,742.—Machine for Cutting Tobacco.—Herbert A. Morse, Canton, Mass.:

I claim, as my invention, the combination of the single guide frame, A, guide bar, D, and its projections or guides with the knife, C, the lever, B, the toothed sector, e, and the rack, d, the whole being substantially as specified.

47,743. Boot Leg.—A. Prescott Mash, Weymouth, Mass.:

I claim a boot leg when corrugated, substantially as and for the purpose specified.

47,744.—Bank Note Engraving.—Waterman L. Ormsby, Jersey City, N. J.:

First, The process by which lines for note engraving is formed, consisting in the repetition of a dot substantially as and for the purposes specified.

Second, I claim the process by which a circular figure, for note engraving is produced by the repetition of a number, figure or word to form each circle of a series of concentric circles, substantially as specified.

Third, I claim the process herein specified by which a geometrical or mosaic figure for note engraving is formed by the repetition of letters, words, designs or figures, around a series of separate centers, substantially as specified.

47,745.—Apparatus for Engraving Metallic Plates.—Waterman L. Ormsby, Jersey City, N. J.:

I claim, First, a circular hammer having several designs in relief around its edge in combination with the dog, g, substantially as specified.

Second, I claim raising or lowering the back end of the design hammer, substantially as specified, for causing the design on the hammer to coincide with the surface of the plate, as set forth.

Third, I claim the plate, e, adjustable as specified, in combination with the plate, c, and design hammer, for the purposes of adjusting said hammer, as set forth.

Fourth, I claim the combination of two circular beds, o w, with the right angled slides, s u, forming a universal bed for adjusting the position of the plate to be engraved, as set forth.

Fifth, I claim the universal bed for carrying and adjusting the plate as aforesaid in combination with the design hammer, substantially as and for the purposes specified.

47,746.—Thrashing Machine.—Nelson Palmer, Hudson, N. Y.:

First, I claim the method herein specified, of thrashing grain transversely by the combined action of the feeding device, the corrugated cylinder and the curved rubber, as set forth.

Second, I claim a revolving cylinder armed with teeth or spikes, in combination with the guard, g, for feeding in the straw or stalks, transversely to the thrashing mechanism, substantially as specified.

Third, I claim the guard, g, in combination with the feeding cylinder, b, thrashing cylinder, b, and concave rubber, c, substantially as specified.

47,747.—Railway Chair.—William H. Peckham, New York City:

I claim the railroad chair herein described, for clamping and holding the contiguous ends of rails, the same consisting of a movable jaw or jaws made to form close bearings with the sides of the rail, by means of one or more screw bolts and nuts, arranged and operating as described.

[This invention relates to a new and peculiar construction of railway chairs, whereby the rails can be firmly clamped and held together, the advantages of which are evident.]

47,748.—Steam Engine.—Walter S. Phelps, Columbus, Ohio:

I claim the arrangement of the vertical cylinder connecting rods, crank shafts and propeller or form shafts, herein recited.

47,749.—Foot Stove.—Edwin H. Reynolds, Rising Sun, Md. Antedated May 9, 1865:

I claim the reservoir, E, burner, F, with its cylinder, G, and the partition, H, the whole being arranged in respect to the case, A, and the openings, a and b, in the latter, substantially as and for the purpose specified.

47,750.—Medical Compound.—Louis Schultz, Buffalo, N. Y.:

I claim a medical compound, composed of the ingredients herein mentioned, combined substantially in the manner and proportions herein set forth.

47,751.—Rotary Steam Engine.—John W. Simonton and O. T. Struble, Taylorville, Ind.:

We claim, First, The combination of the revolving valve, D D' with the abutment, R R, having induction ports through it, substantially as described.

Second, The arrangement of the chamber, C A and B, and the eduction passages, H and F, substantially as shown and described.

47,752.—Smoking Pipe.—Wm. T. Slocum, Philadelphia, Pa.:

I claim the stem, B, with its partition, a, projection, ', and openings, x and x', in combination with the detachable reservoir, F, and the bowl, A, substantially as and for the purpose specified.

47,753.—Plow Casting.—Francis F. Smith, Collinsville, Conn.:

I claim as a new manufacture, plow plates, made of semi-steel, or iron plated or faced with cast-steel.

47,754.—Packing Projectiles for Rifled Ordnance.—Wilson H. Smith, Birmingham, Conn.:

I claim the employment, in combination with a projectile, of a corrugated or grooved packing, and a follower or tail piece, the whole arranged to operate in the manner and for the purpose substantially as set forth.

47,755.—Breech-loading Fire-arm.—C. Edward Sneider, Baltimore, Md.:

First, I claim the backward projection, A, of the charge chamber, constructed as described, to permit the ready removal of the cartridge shell with the thumb and finger, in combination with the chamber, D', inclosing the said projection, A, while in position for firing.

Second, In combination with the above, I further claim, in the pin or screw, d, employed to start the shell of the exploded cartridge during the opening movement of the gun, substantially as described.

Third, I claim the pin, G, in combination with the cam lug, F, the two operating in the act of turning the barrel to throw the hammer to the point at which the safety notch engages with the trigger to retain the hammer in a retracted position, and thus allow the exploding pin, I, to move freely to the pressure of the base of the cartridge during the closing movement of the barrel, substantially as set forth.

47,756.—Flour Sifter.—Howard Tilden, Philadelphia, Pa.:

I claim the combination of the case, A, the concave sieve, B, the cross beam, C, the horizontal cross arms, D D, bottom, E, spout, F, base, G, slide, H, flange, I, the rubber scrapers, J J J, radial arms K K K K, the shaft and crank, L, as and for the purpose set forth.

47,757.—Bed Bottom.—Charles B. Tucker, Cambridgeport, Mass.:

I claim the improved spring bed bottom, so constructed of the springs, C C C, and the rollers, h h h, arranged and combined together with the frame, A, substantially in manner and so as to operate as hereinafter specified.

47,758.—Latch.—Edward A. Tuttle, Brooklyn, N. Y.—Antedated May 5, 1865:

I claim the beveled tongue, C, or its equivalent, applied to a lock or latch, substantially as shown and described, for the purpose set forth

47,759.—Hot-air Engine.—Stephen Wilcox, Jr., Westerly, R. I.:

First, I claim, in combination with an engine in which the combustion is conducted under the working pressure, the employment of an adjustable cut-off mechanism, arranged to operate therewith, substantially in the manner and for the purposes herein set forth.

Second, I claim the controlling chamber, Q, orifice, q, and screw plug, 13, arranged relatively to the piston, 12, and to the induction valve, I, and its connections, substantially as and for the purpose herein set forth.

Third, I claim the combination of thermostat, R T, or its equivalent, with the regulating valve, U, the two channels, H and H', and the wiping, A a, the whole being so arranged as to automatically control the proportions of air relatively to the gaseous products of combustion actuating the engine, substantially in the manner and for the purpose herein set forth.

Fourth, I claim the pump, V, and pipes, v4, and G, or their equivalents, arranged relatively to the compressing parts, A a, and heating parts, B, etc., or their equivalents, substantially as herein described, so that I can cause the water to perform the several functions in the manner herein set forth.

Fifth, I claim the arrangement of the inhaling valve, F, and lever, W, or its equivalent, substantially as and for the purpose herein set forth.

Sixth, I claim connecting the circular door, X, to the hinged bar or arm, L, by the hollow bolt, x, and stem, x', or their equivalents, so that the door may be readily released and ground, and again secured, in the manner substantially as herein set forth.

Seventh, I claim the guard lips, X' and Y', arranged relatively to the door, X, of the furnace, and to the ground surfaces on the same, and on the door frame, Y, substantially as and for the purpose herein set forth

47,760.—Breast Pump.—C. H. Wilder, Argyle, Wis.:

I claim, First, The application to the mouth of a breast pump of a supporting screen, constructed and operating substantially in the manner and for the purpose set forth.

Second, The employment or use of an extension mouthpiece, D, applied in combination with the supporting screen and with the suction pipe of a breast pump, substantially in the manner and for the purpose described.

[This invention consists in the application to the mouth of a breats

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pump of a supporting screen, in such a manner that the air is brought to act direct upon the end of the nipple, and upon every natural course through which the milk can be drawn, and all undue strain on any part of said nipple is avoided. The invention consists further in the employment or use of an extension piece, in combination with the supporting screen applied to the end of the suction pipe of a breast pump, in such a manner that the instrument can be accommodated to nipples of different lengths, by adjusting the extension piece, and that the pump can be operated without pain in all cases.]

47,761.—Hoisting Machine.—Morgan Willard, Cincinnati, Ohio:

I claim the hollow columns, G G, with the continuous thread or screw, D', and the continuous slots or openings in or through the sides of the said columns, G G, extending throughout their length, in combination with the bolt or worm, D, with the shaft or rod, C, all arranged, actuated and combined, substantially as set forth and described.

47,762.—Hames Fastener.—J. B. Woolsey, Bloomfield, Iowa:

I claim combining the spring, c, with the catch, C, in the manner and for the purpose as described.

47,763.—Churn Dasher.—E. M. Wright, Wilmington, Ohio:

I claim the stops, d d, arranged upon the lower surfaces of the dasher wings, substantially as and for the purpose herein specified.

47,764.—Snap Hook.—Charles B. Bristol (assignor to himself, William W. Hughes, William H. Andrews, and L. J. Bristol), New Haven, Conn.:

I claim the combination of the tongue, g, with the spiral spring (Fig. 4), when the spring works on the tension principle, and rests in a recess (as r) in the rear end of the tongue, substantially as described.

Second, I claim the combination of the fulcrum pin, n, with the tongue, g, when the pin, n, is cast in one of the ears, and the recess or cavity is fitted to be closed, substantially as herein described.

47,765.—Metallic Thill Holder.—Ebenezer Brown (assignor to S. E. Brown), South Boston, Mass.:

I claim, First, Casting the tug-strap loop and the shaft-girth loop in one with the thill holder, substantially as and for the purpose described.

Second, Casting the tug-strap buckle in the metallic thill holder, substantially as set forth and for the purpose described.

47,766.—Steam Engine.—Robert H. Davies (assignor to himself, James W. Landell, and Thomas J. Young), Philadelphia, Pa.:

I claim, First, The heater, D, used as a bed plate, detached from the supports of the pedestals, E, and fixed to the boiler in such a manner as to prevent the expansion of the boiler from putting a strain upon the engine, substantially as shown and described.

Second, I claim the arrangement of the saddle, F, cylinder, B, side bars, C, heater, D, and boiler, A, substantially as described.

47,767.—Machinery for Oiling Wool in Carding Machines.—James Eccles (assignor to himself and Robert Kershaw), Philadelphia, Pa.:

I claim lubricating wool by means of a strip or apron of suitable textile fabric, to which a continuous supply of lubricating material is transferred from a reservoir by means of a drum or roller, or its equivalent, all substantially as set forth.

47,768.—Coal Sifter.—John Martino (assignor to Stuart & Peterson), Philadelphia, Pa.:

I claim the sieve, G, its handle, h, and spout, f, arranged in respect to the ash chamber, B, and grate, a, of a cooking stove, substantially as and for the purpose herein set forth.

47,769.—Machine for Making the Spindles of Wagon Axles.—James M. Jay, Canton, Ohio, assignor to W. H. Alexander & Co.:

I claim a machine for turning the journal or spindle, for cutting the groove therein, and for boring the linch pin hole of wooden axles, the same being combined and arranged to operate in the manner and for the purpose substantially as set forth.

I also claim, in a machine for cutting journals or spindles on axles, the revolving tapering cutter-head, with its cutters, e e', as and for the purpose described.

47,770.—Turned Shoe.—Gordon McKay, Boston, Mass., and Lyman R. Blake, Quincy, Mass., assignors to Gordon McKay aforesaid:

We claim, as a new article of manufacture, a boot or shoe made as a "turn," with the vamp and sole united with chain stitches passing entirely through the material both of the vamp and sole, and with the chain of the stitches upon the inside of the article when in its finished state.

47,771.—Riding Saddle.—George H. Meeker (assignor to Lacy, Meeker & Co.), Bridgeport, Conn.:

I claim the forming of the projections, or calf and thigh supports, on the skirts of a riding saddle, by means of swaging, substantially in the manner as herein shown and described.

47,772.—Grain Separator.—Joseph Montgomery, James Montgomery, and Evan Davis, Baltimore, Md.:

We claim the revolving rake shafts, C, in combination with the fan screen, e, substantially in the manner and for the purpose herein set forth.

47,773.—Steam Hoisting Apparatus.—Charles R. Otis (assignor to himself and Norton P. Otis) Yonkers, N. Y.:

I claim combining the stop valve of the engine of a steam-hoisting apparatus with the shaft, h, of the main drum, or with any other shaft or counter shaft of the hoisting apparatus, by means of a stop motion constructed, applied and operating substantially as herein specified.

47,774.—Clothes Wringer.—James N. Pease, Panama, N. Y., assignor to M. Harris and R. G. Bush:

I claim the two fixed gears, E F, in connection with the wrist, e, and slotted crank, G, or their equivalents, all arranged and applied to the rollers of a clothes-wringing machine, to operate in the manner substantially as and for the purpose herein set forth.

47,775.—Revolving Fire-arm.—John H. Vickers (assignor to himself and Lucius W. Pond), Worcester, Mass.:

I claim the application to the barrel of revolving fire-arms of a hinged stem, E, for supporting the thimble, and cleaning it when removed from the cylinder, A, substantially as and for the purpose described.

47,776.—Submarine Explosive Shell.—Willliam W. W. Wood, Philadelphia, Pa., and John L. Lay, Buffalo, N. Y., assignors to Donald McKay, East Boston, Mass. Antedated Feb. 26, 1865:

We claim, First, A submarine shell or torpedo composed of a casing of any desired form and of any suitable material, so charged with explosive compound as to leave air space within the shell, for the purpose specified.

Second, The use within the shell of a yielding wad or diaphragm for separating the charge of the explosive compound from the air chamber, substantially as and for the purpose described.

Third, The employment for igniting the charge of a weight so arranged within or adjacent to the said casing, and so combined with the retaining and releasing device herein described, or any equivalent to the same, that the said weight can be released at pleasure, and be permitted to fall on any substance ignitable by percussion.

47,777.—Scroll Sawing Machine.—Lysander Wright (assignor to Wright & Smith), Newark, N. J.:

I claim the arrangement of lever, A, segmental wheel, B, pullies, C C, strap, D, levers, G G, and hooks, E' E'', spring, I, connected to lever, G, by link, K, when operated by treadles, J' and J'', substantially as described and for the purposes set forth.

47,778.—Sextant.—Pierre Michel Albert Laurent, St. Nazaire, France:

I claim, First, Elongating perpendicularly to the plane of the reflecting instrument the apparent image from one of the heavenly bodies or objects from which may be measured the angular distance, in the manner set forth.

Second, The elongating lens or glasses, combined according to the above-described conditions, and, in combination therewith, the above-described modification of the plane form of mirrors of reflecting instruments, as set forth.

47,779.—Stopper for Jars, Bottles, Etc.—Nathan Thompson, Abbey Gardens, St. John's Wood, Eng. Patented in England Jan. 4, 1865:

I claim, First, Constructing stoppers of an elastic ring, interposed between two parts, which are so combined with the lever that the parts may be moved to or from each other by the lever, as above described.

Second, Forming the upper part of a stopper, so constructed with a projecting ring of larger diameter than the mouth of the bottle or other article to which the stopper is to be applied.

Third, I claim a recess in said top for the lever to lie in.

Fourth, I claim connecting the lever to the lower part of the stopper by a hook, as above described.

47,780.—Manufacture of Railroad Car Wheel.—John D. Murphy, Pottsville, Pa.:

I claim, First, Constructing the rim or tread and the spokes of wrought iron, and attaching the same to each other before the hub is cast, by riveting the spokes when hot to the rim, and casting the hub around the flattened and expanded opposite ends of the spokes, substantially as set forth.

Second, Pouring a stream of melted metal over the flattened and expanded ends of the spokes, and permitting it to pass freely away from them until said expanded ends shall have attained to a high degree of heat, and then allowing the mold to fill and the metals to unite with each other, substantially as specified.

REISSUES.

1,957.—Means of Operating the Valves of Steam Engines.—Nathan M. Condict and Dudley S. Steele, Jersey City, N. J., assignees by mesne assignments of Wm. J. Stevens, New York City. Patented July 23, 1861:

We claim, First, When a main and secondary slide valve are employed on seats arranged side by side in the same steam chest and in the same plane, or parallel planes, as and for the purpose specified, so combining the said valves with each other and with mechanism through which they are both in part actuated by the main piston rod of the engine that there is a lost motion between the said valves, substantially as and for the purpose herein set forth.

Second, We claim the direct connection of the said main and secondary valves with the same operating rod, F, having attached to it the pistons, I I', for completing the movement of the main valve, and having a lost motion with respect to the main valve, but none with respect to the secondary valve, substantially as herein described.

Third, The crank, K, and forked lever, N, applied substantially as herein described, in combination with each other, and with the valve rod and main piston rod, substantially as and for the purpose herein set forth.

1,958.—Manufacture of Dye Colors.—Manley Howe and Henry R. Stevens, Boston, Mass. Patented Oct. 13, 1863:

We claim a composition of coloring matter in powder with the requisite kind and quantity of mordant in powder, the whole thoroughly mixed together, as hereinbefore set forth.

Also coloring matter in powder mixed with metallic solution, dried off and reduced to powder, as hereinbefore set forth.

Also coloring matter in powder containing the requisite kind and quantity of mordant, the whole reduced from a pasty state of powder, as hereinbefore set forth.

Each constituting a direct and substantive dye and a new article of manufacture.

Also, the above-described compositions of coloring matters and mordants adapted to dye silk, woolen or cotton, or fabrics composed of any or all of the said materials.

1,959.—Manufacture of Dye Colors.—Manly Howe and Henry R. Stevens, Boston, Mass. Patented Oct. 13, 1863:

First, We claim mixing with dye color in powder, mordants reduced to powder, to produce a color substantially as set forth.

Second, We also claim mixing dye colors and mordants when the latter is a solution of metal, and then drying and reducing the same to powder, substantially as set forth.

Third, We claim the combination with dye colors and mordants, when in a moist or pasty state, of stock or other similar absorbent, substantially and for the purpose as hereinbefore set forth.

Also, the use of starch for treating the mixture thoroughly dry, substantially and for the purpose as hereinbefore set forth.

Fourth, We also claim reducing coloring extracts to powder, substantially as hereinbefore set forth, and mixing them in powder with other coloring matter in powder.

Also mixing them in powder with other coloring matter and mordants in powder, substantially and for the purpose as hereinbefore set forth.

1,960.—Preserving Fruits and other Perishable Substances.—Benj. M. Nyce, Cleveland, Ohio. Patented Nov. 2, 1858. Reissued Oct. 23, 1860:

I claim, First, The insulated and cooled preserving chamber, J, provided with absorbents of moisture, as set forth, either with or without the agitator, K.

Second, I claim the above-described outside air-tight casings of walls, when used in combination with a chamber chilled by ice on a metallic floor on its upper part, with absorbents of moisture within said chamber.

Third, I claim the method of preserving fruit in a chamber whose walls, doors and floors are practically air tight, and so proof against the ingress of heat and moisture as to maintain by the aid of ice on metal floor above a uniform temperature from 34° to 55° F. throughout the year, and by the use of absorbents within said chamber producing any desired degree of dryness.

1,961.—Harvester.—Worden P. Penn, Belleville, Ill. Patented Sept. 10, 1861:

I claim, First, The combination of the jointed frame, by which the sickle may be elevated, with the means for counteracting the angularity that would otherwise affect the operation of the sickle, and with a finger bar, which may be either flexible or rigid, the whole constructed and arranged in the manner described.

Second, Connecting the finger bar to the frame by means of the hinge joint and the upright, in the manner described, so that the connection with the said frame may be made either flexible or rigid, as specified.

Third, The arrangement of the transverse rocking beam, k, on the underside of frame, A', in combination with the finger bar, g, substantially in the manner and for the purpose described.

Fourth, Arranging the transverse rocking beam, k, on the under side of the frame, A', and pivoting the finger beam, g, to it thus arranged, substantially in the manner and for the purpose herein described.

Fifth, Applying the lever, m, to the machine in such manner that it will serve the double purpose of elevating the cutting apparatus, and also of tilting it forward or backward, substantially as described.

Sixth, The arrangement of the two caster wheels, o t, frame, A A', jointed upon the axle, lever, m, serving the double purpose described, and finger beam, q, and rocking beam, k, in the manner and for the purpose herein described.

Seventh, Arranging the spur wheel, B, sliding pinion wheel, B', clutch, j, lever, W, lever clutch wheel, C, crank pinion, D, with the frame, A A', rocking beam, k, and jointed finger beam, q, all in the manner and for the purpose described.

Eighth, The draft pole, C, in combination with frame, A, the rear of which frame is pivoted to the axle tree, a, and with frame, A', also pivoted to the axle tree, a, and with the gearing and cutting apparatus, all constructed and applied substantially in the manner and for the purpose described.

1,962.—Sewing Machine.—Elmer Townsend, Boston, Mass., assignee of Sidney A. Turner, Westborough, Mass. Patented Aug. 22, 1854. Reissued March 25, 1856.

I claim the combination in a sewing machine of an automatic feed, a work-supporting surface, and a needle, when the same is arranged to operate from below the table or work-supporting surface, and without the co-operation of a second thread (or a device carrying a second thread) above the table or work-supporting surface.

Also, the combination together of a needle and awl, when the same enter the work in opposite directions, and each withdraws in a direction opposite that from which it entered.

Also, the combination in a sewing mechanism of an automatic needle turner and automatic feed, by which the loop is kept in proper position with respect to the needle as the work progresses.

Also, the method of effecting the rotation of the hook, substantially as specified.

DESIGNS.

2,066.—Trade Mark.—F. E. Covell, Portland, Me.

2,067.—Shoe.—Henry Hunt, Abington, Mass.

2,068.—Coffin Handle.—Charles L. Neiberg (assignor to Sargent & Co.), New Haven, Conn.

2,069.—Coffin.—William W. Roberts, Hartford, Conn.

2,070.—Coffin.—G. W. & W. P. Wooley, Hartford, Conn.

2,071.—Coffin.—G. W. & W. P. Wooley, Hartford, Conn.

PATENTS

GRANTED

FOR SEVENTEEN YEARS.

MUNN & COMPANY,

In connection with the publication of the SCIENTIFIC AMERICAN, have acted as Solicitors and Attorneys for procuring "Letters Patent" for *new inventions* in the United States and in all foreign countries during the past *seventeen years*. Statistics show that nearly ONE-THIRD of all the applications made for patents in the United States are solicited through this office; while nearly THREE-FOURTHS of all the patents taken in foreign countries are procured through the same source. It is almost needless to add that, after *seventeen years'* experience in preparing specifications and drawings for the United States Patent Office, the proprietors of the SCIENTIFIC AMERICAN are perfectly conversant with the preparation of applications in the best manner, and the transaction of all business before the Patent Office; but they take pleasure in presenting the annexed testimonials from the three last ex-Commissioners of Patents.

MESSRS. MUNN & CO.:—I take pleasure in stating that, while I held the office of Commissioner of Patents, MORE THAN ONE-FOURTH OF ALL THE BUSINESS OF THE OFFICE CAME THROUGH YOUR HANDS. I have no doubt that the public confidence thus indicated has been fully deserved, as I have always observed, in all your intercourse with the office, a marked degree of promptness, skill, and fidelity to the interests of your employers. Yours very truly,

CHAS. MASON.

Judge Mason was succeeded by that eminent patriot and statesman, Hon. Joseph Holt, whose administration of the Patent Office was so distinguished that, upon the death of Gov. Brown, he was appointed to the office of Postmaster-General of the United States. Soon after entering upon his new duties, in March, 1859, he addressed to us the following very gratifying letter.

MESSRS. MUNN & CO.:—It affords me much pleasure to bear testimony to the able and efficient manner in which you discharged your duties as Solicitors of Patents, while I had the honor of holding the office of Commissioner. Your business was very large, and you sustained (and I doubt not justly deserved) the reputation of energy, marked ability, and uncompromising fidelity in performing your professional engagements.

Very respectfully, your obedient servant,

J. HOLT.

Hon. Wm. D. Bishop, late Member of Congress from Connecticut, succeeded Mr. Holt as Commissioner of Patents. Upon resigning the office he wrote to us as follows:

MESSRS. MUNN & CO.:—It gives me much pleasure to say that, during the time of my holding the office of Commissioner of Patents, a very large proportion of the business of inventors before the Patent Office was transacted through your agency; and that I have ever found you faithful and devoted to the interests of your clients, as well as eminently qualified to perform the duties of Patent Attorneys with skill and accuracy. Very respectfully, your obedient servant,

WM. D BISHOP.

THE EXAMINATION OF INVENTIONS.

Persons having conceived an idea which they think may be patentable, are advised to make a sketch or model of their invention, and submit it to us, with a full description, for advice. The points of novelty are carefully examined, and a written reply, corresponding with the facts, is promptly sent, free of charge. Address MUNN & CO., No. 37 Park Row, New York.

As an evidence of the confidence reposed in their Agency by inventors throughout the country, Messrs. MUNN & CO. would state that they have acted as agents for more than TWENTY THOUSAND inventors! In fact, the publishers of this paper have become identified with the whole brotherhood of inventors and patentees, at home and abroad. Thousands of inventors for whom they have taken out patents have addressed to them most flattering testimonials for the services rendered them; and the wealth which has inured to the individuals whose patents were secured through this office, and afterwards illustrated in the SCIENTIFIC AMERICAN, would amount to many millions of dollars! Messrs. MUNN & CO. would state that they never had a more efficient corps of Draughtsmen and Specification Writers than those employed at present in their extensive offices, and that they are prepared to attend to patent business of all kinds in the quickest time and on the most liberal terms.

PRELIMINARY EXAMINATIONS AT THE PATENT OFFICE.

The service which Messrs. MUNN & CO. render gratuitously upon examining an invention does not extend to a search at the Patent Office, to see if a like invention has been presented there; but is an opinion based upon what knowledge they may acquire of a similar invention from the records in their Home Office. But for a fee of $5, accompanied with a model, or drawing and description, they have a special search made at the United States Patent Office, and a report setting forth the prospects of obtaining a patent, &c., made up and mailed to the inventor, with a pamphlet, giving instructions for further proceedings. These preliminary examinations are made through the Branch Office of Messrs. MUNN & CO., corner of F and Seventh streets, Washington, by experienced and competent persons. Many thousands of such examinations have been made through this office, and it is a very wise course for every inventor to pursue. Address MUNN & CO., No 37 Park Row, New York.

THE VALIDITY OF PATENTS.

Persons who are about purchasing patent property, or patentees who are about erecting extensive works for manufacturing under their patents, should have their claims examined carefully by competent attorneys, to see if they are not likely to infringe some existing patent, before making large investments. Written opinions on the validity of patents, after careful examination into the facts, can be had for a reasonable remuneration. The price for such services is always settled upon in advance, after knowing the nature of the in-

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vention and being informed of the points on which an opinion is solicited. For further particulars address MUNN & CO., No. 37 Park Row, New York.

The Patent Laws, enacted by Congress on the 2d of March, 1861 are now in full force, and prove to be of great benefit to all parties who are concerned in new inventions.

The law abolishes discrimination in fees required of foreigners, excepting natives of such countries as discriminate against citizens of the United States—thus allowing Austrian, French, Belgian, English, Russian, Spanish and all other foreigners, except the Canadian, to enjoy all the privileges of our patent system (except in cases of designs) on the above terms. Foreigners cannot secure their inventions by filing a caveat; to citizens only is this privilege accorded.

CAVEATS.

Persons desiring to file a caveat can have the papers prepared in the shortest time by sending a sketch and description of the invention. the Government fee for a caveat is $10. A pamphlet of advice regarding applications for patents and caveats is furnished gratis, on application by mail. Address MUNN & CO., No. 37 Park Row, New York.

REJECTED APPLICATIONS.

Messrs. MUNN & CO. are prepared to undertake the investigation and prosecution of rejected cases, on reasonable terms. The close proximity of their Washington Agency to the Patent Office affords them rare opportunities for the examination and comparison of references, models, drawings, documents, &c. Their success in the prosecution of rejected cases has been very great. The principal portion of their charge is generally left dependent upon the final result.

All persons having rejected cases which they desire to have prosecuted, are invited to correspond with MUNN & CO., on the subject, giving a brief history of the case, inclosing the official letters, &c.

HOW TO MAKE AN APPLICATION FOR A PATENT.

Every applicant for a patent must furnish a model of his invention if susceptible of one; or, if the invention is a chemical production, he must furnish samples of the ingredients of which his composition consists, for the Patent Office. These should be securely packed, the inventor's name marked on them, and sent, with the Government fees, by express. The express charge should be pre paid. Small models from a distance can often be sent cheaper by mail. The safest way to remit money is by a draft on New York, payable to the order of Messrs. MUNN & CO. Persons who live in remote parts of the country can usually purchase drafts from their merchants on their New York correspondents; but, if not convenient to do so, there is but little risk in sending bank bills by mail, having the letter registered by the postmaster. Address MUNN & CO., No. 37 Park Row New York.

MUNN & CO. wish it to be distinctly understood that they do not speculate or traffic in patents, under any circumstances; but that they devote their whole time and energies to the interests of their clients.

Patents are now granted for SEVENTEEN years, and the Government fee required on filing an application for a patent is $15. Other changes in the fees are also made as follows:—

On filing each Caveat	$10
On filing each application for a Patent, except for a design	$15
On issuing each original Patent	$20
On appeal to Commissioner of Patents	$20
On application for Re-issue	$30
On application for Extension of Patent	$50
On granting the Extension	$50
On filing a Disclaimer	$10
On filing application for Design (three and a half years)	$10
On filing application for Design (seven years)	$15
On filing application for Design (fourteen years)	$30

SEARCHES OF THE RECORDS.

Having access to all the official records at Washington, pertaining to the sale and transfer of patents, MESSRS. MUNN & CO., are at all times ready to make examinations as to titles, ownership, or assignments of patents. Fees moderate.

ASSIGNMENTS OF PATENTS.

The assignment of patents, and agreements between patentees and manufacturers, carefully prepared and placed upon the records at the Patent Office. Address MUNN & CO., at the Scientific American Patent Agency, No. 37 Park Row, New York.

FOREIGN PATENTS.

Messrs. MUNN & CO., are very extensively engaged in the preparation and securing of patents in the various European countries. For the transaction of this business they have offices at Nos. 66 Chancery lane London; 29 Boulevard St. Martin, Paris; and 26 Rue des Eperonniers, Brussels. They thing they can safely say that THREE-FOURTHS of all the European Patents secured to American citizens are procured through their agency.

Inventors will do well to bear in mind that the English law does no limit the issue of patents to inventors. Any one can take out a patent there.

Circulars of information concerning the proper course to be pursued in obtaining patents in foreign countries through MUNN & CO'S Agency, the requirements of different Government Patent Offices, &c., may be had, gratis, upon application at the principal office, No. 37 Park Row, New York, or any of the branch offices.

INVITATION TO INVENTORS.

Inventors who come to New York should not fail to pay a visit to the extensive offices of MUNN & CO. They will find a large collection of models (several hundred) of various inventions, which will afford them much interest. The whole establishment is one of great interest to inventors, and is undoubtedly the most spacious and best arranged in the world.

COPIES OF PATENT CLAIMS.

MESSRS. MUNN & CO., having access to all the patents granted since the rebuilding of the Patent Office, after the fire of 1836, can furnish the claims of any patent granted since that date, for $1.

EXTENSION OF PATENTS.

Many valuable patents are annually expiring which might readily be extended, and if extended, might prove the source of wealth to their fortunate possessors. Messrs. MUNN & CO. are persuaded that very many patents are suffered to expire without any effort of extension, owing to want of proper information on the part of the patentees, their relatives or assigns, as to the law and the mode of procedure in order to obtain a renewed grant. Some of the most valuable grants now existing are *extended patents*. Patentees, or, if deceased, their heirs, may apply for the extension of patents, but should give ninety days' notice of their intention.

Patents may be extended and preliminary advice obtained, by consulting, or writing to, MUNN & CO., No. 37 Park Row, New York.

UNCLAIMED MODELS.

Parties sending models to this office on which they decide not to apply for Letters Patent and which they wish preserved, will please to order them returned as early as possible. We cannot engage to retain models more than one year after their receipt, owing to their vast accumulation, and our lack of storage room. Parties, therefore, who wish to preserve their models should order them returned within one year after sending them to us, to insure their obtaining them. In case an application has been made for a patent the model, is in deposit at the Patent office, and cannot be withdrawn.

It would require many columns to detail all the ways in which the Inventor or Patentee may be served at our offices. We cordially invite all who have anything to do with patent property or inventions to call at our extensive offices, No. 37 Park Row, New York, where any questions regarding the rights of Patentees, will be cheerfully answered.

Communications and remittances by mail, and models by express prepaid should be addressed to MUNN & CO. No. 37 Park Row, New York.

Notes and Queries

E. B., of N. Y.—The steam in your vessel would condense, and the vessel would fill with cold water.

F. M., of Pa.—The most effectual protection for the iron in your safes would be a coating of zinc—galvanizing, as it is improperly called.

F. W. S., of Ohio.—We publish in another place a recipe for making blue ink, for your special benefit.

C. H. B., of Pa.—The oxide of zinc which you want for rendering castings malleable is the red oxide ore, which you can procure from the New Jersey Zinc Co., Newark N. J. It has been suggested that the zinc if employed for this purpose would form an alloy with the iron and injure its quality.

G. W. H., of U. S. N.—To compute the dimensions of a triangle at least three elements must be known, but you give only the angles. We presume this is an oversight, as you must know that triangles might be precisely similar in their angles and yet have sides of all length, from an inch to millions of miles. In the second problem it is manifest that the force required to raise the weight would vary with the angle of the cord.

X.—Yes.

G. & B., of Pa.—Compressed air is used for driving machinery at one of the mines in Scotland, and at the Mount Cenis tunnel, but we are not aware that it is in use anywhere in this country. It was employed at one time for driving a number of sewing machines in Centre street in this city. We should not suppose it would leak more than steam, and it would not be subject like steam to condensation in long pipes.

J. W. S., of Mo.—We do not know of any work on cutting box-wood or preparing it for market.

O. C., of R. I.—Ulysses Pratt, of Deep River, Conn., has a patent for bleaching ivory. You had better write to him for information.

J. A. H., of Me.—The answer which you criticize was precisely correct, as you will see when you have examined the subject more carefully.

W. L., of Conn.—It is generally supposed that the center of the earth is a mass of molten matter; as it cools it shrinks, allowing the hardened crust to settle down. Sometimes this settling in of the crust forces out a portion of the molten mass, in the form of lava, through the craters of volcanoes.

F. S. N., of Ky.—We do not see how any correct or useful comparison can be made between the performances of our Eastern boats and the proportions of their wheels and Western boats which run in shallow water. You will find practical rules governing the size of wheels, pitch of the buckets, width and length of same in Burgh's land and marine engines, published by H. C. Baird, No. 406 Walnut street, Philadelphia. Bourne, in his "Catechism of the Steam Engine," page 283, says:—To find the proper area of a single bucket divide the horse-power by the diameter of the wheel in feet, which will give the area in square feet. The area multiplied by 0·6 will give the length in feet. For fast vessels the proportions as given above are one-fourth part less, and the area must be multiplied by 0·7.

T. W. M., of N. Y.—We accept your correction of our statement that smokepipes do not rust from steam exhausting in them; doubtless cases occur where they do rust from this cause.

W. E. E., of Vt.—You will find statements of the laws relating to falling bodies in a late number of the SCIENTIFIC AMERICAN; we refer you to it for a decision on your bet.

J. B. C., of Ill.—India-rubber cement is best for sticking labels on minerals.

I. S., of Conn.—Make a varnish by dissolving shellac in alcohol; coat your strawberry basket bottoms with it and they will be water proof—neither shrinking nor swelling.

O. M. S., of R. I.—We know of no way of making mica green or straw color except by painting it.

G. W. P., of Mass.—In a patentable sense a hinge would be the equivalent of a pivot.

T. H., of Pa.—Your invention appears to us to be new and patentable. We advise you, however, to remit $5 and have a Preliminary Examination made at the Patent Office. We will send you one of our pamphlets by mail.

H. B., of Wis.—The Polytechnic Association holds its meetings at the building in this city known as the Cooper Institute S. D. Tillman, the President of the Association, resides in this city.

S. C. & Co., of Ohio.—The mineral which you sent to us we handed to Professor Seely, and he pronounces it native lodestone. Chemically it is the same as ordinary magnetic iron ore, unless there may be some slight variation in the composition which gives it its peculiar power of retaining magnetism permanently.

R. H. A., of Md.—When a spherical or other projectile rises perpendicularly in the atmosphere, the resistance of the air prevents it from rising as high as it would in a vacuum, and then this same resistance diminishes its velocity during its descent. If the projectile passed through air only during its ascent, and fell through a vacuum, it would strike the earth with a velocity less than that with which it started upward, owing to the fact that it would not rise as high as if it moved without resistance.

C. B. R., of Me.—Leather belts are made up of several pieces, not cut in a continuous strip from the hide, as you seem to think. The best belts are cut out of the back of the hide.

S. L., of N. J.—It is a common practice to heat old coin in order to make the inscription more legible.

F. S. B., of Ind.—You will not be able to get 12 miles an hour out of your boat unless at a sacrifice of everything to obtain it, and at a cost exceeding its practical value. The resistance to motion of two hulls of a given midship section is much greater than one hull of the same aggregate area as the two combined, and it therefore follows that the engine which would propel the single hull at a given speed would not answer for the plan with double hulls. We recommend you to use if possible two cylinders, eight inches and a half diameter, or one cylinder 12 inches diameter all having 24 inches stroke. These cylinders have nearly the same cubic capacity but the mechanical advantage is in favor of the two small cylinders coupled.

TO OUR READERS.

PATENT CLAIMS.—Persons desiring the claim of any invention which has been patented within thirty years, can obtain a copy by addressing a note to the Office, stating the name of the patentee and date of patent, when known, and enclosing $1 as fee for copying. We can also furnish a sketch of any patented machine issued since 1853, to accompany the claim, on receipt of $2. Address MUNN & CO., Patent Solicitors, No. 37 Park Row, New York.

RECEIPTS.—When money is paid at the office for subscriptions, a receipt for it will always be given; but when subscribers remit their money by mail, they may consider the arrival of the first paper a *bona-fide* acknowledgement of our receipt of their funds.

INVARIABLE RULE.—It is an established rule of this office to stop sending the paper when the time for which it was pre-paid has expired

MODELS are required to accompany applications for Patents under the new law, the same as formerly, except on design patents, when two good drawings are all that are required to accompany the petition, specification and oath, except the Government fee.

Back Numbers and Volumes of the "Scientific American."

VOLUME IV., VII. AND VOLUME XI.. (NEW SERIES) complete (bound) may be had at this office and from periodical dealers. Price, bound, $3 00 per volume, by mail, $3 75 which includes postage. Every mechanic, inventor or artisan in the United States should have a complete set of this publication for reference Subscribers should not fail to preserve their numbers for binding. VOLS. I., II., III., V., VI., VIII., IX. and X., are out of print and cannot be supplied.

NOTICE TO SUBSCRIBERS.

The first five numbers of the present volume of the SCIENTIFIC AMERICAN being out of print, we shall commence the time of each new subscriber from the date of receipt of the order, unless the writer states specifically that he wishes such back numbers as can be furnished.

RATES OF ADVERTISING.

TWENTY-FIVE CENTS per line for each and every insertion, payable in advance. To enable all to understand how to calculate the amount they must send when they wish advertisements published we will explain that eight words average one line. Engravings will not be admitted into our advertising columns, and, as heretofore, the publishers reserve to themselves the right to reject any advertisement they may deem objectionable.

CHIEF QUARTERMASTER'S OFFICE, No. 1,139 GIRARD STREET, PHILADELPHIA DEPOT, May 18, 1865.

SEALED PROPOSALS WILL BE RECEIVED AT this office until TUESDAY, May 23, 1865, at 12 M., for immediate delivery at the Schuylkill Arsenal, in merchantable packages (cases to be made to conform to specifications at this office):

Burlaps, 40 and 50-inch.
4-4 Bleached Muslin.
Brown Holland.

Parties offering goods should make separate proposals for each article offered, the quantity they propose to furnish, the price (*which should be written both in words and figures*), and conform to the terms of this advertisement, *a copy of which should accompany each proposal*.

Samples, when submitted, must be marked and numbered to correspond with the proposals; and the parties thereto must guarantee that the goods shall be in every respect equal to army standard, otherwise the proposals will not be considered.

Bids will be opened on TUESDAY, May 23, 1865, at 12 o'clock M., when bidders are requested to be present.

Each bid must be guaranteed by two responsible persons, whose signatures must be appended to the guaranty, and certified to as being good and sufficient security for the amount involved by some public functionary of the United States.

All proposals should be made out on the regular forms, which will be furnished on application at this office.

The right is reserved to reject any bid deemed unreasonable, and no bid from a defaulting contractor will be received.

Indorse envelope "Proposals for (here insert the name of the articles offered)" and address

Colonel WILLIAM W. MCKIM,
Chief Quartermaster,
1 Philadelphia Depot.

CAUTION.—IMITATIONS OF "WINANS' ANTI-INCRUSTATION POWDER" flood the market. Beware of them. I will undersell anything offered. H. N. WINANS, N. Y. 22 3*

GILBERT'S PATENT COAL AND ASH SIFTER—A new and useful invention, of which a portion of the State Rights are for sale. Address EMERY & HUTCHINSON, Manufacturers, No. 57 Canton street, Boston, Mass. 22 10

BOLTS, NUTS, WASHERS, SET SCREWS, COACH Screws and Machine Screws, constantly on hand for sale by LEACH BROTHERS, No. 86 Liberty street, New York. 21 12*

WORRALL'S PATENT CHUCKS FOR SCREW MACHINE and Holding Wire Drills and other articles—The cheapest and best chuck for drills in use. 1½ inch in diameter, holding any size from ⅛ up to ½ inch. Perfectly true and reliable Address THOS. H. WORRALL, Lawrence, Mass. 20 4

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TRIP HAMMERS.
Parties using or intending to erect Trip Hammers are invited to call and examine the Hotchkiss Patent Atmospheric Hammer, made by CHARLES MERRILL & SONS, No. 555 Grand street, New York They are run by a belt; occupy 2¼ by 4 feet space; strike 200 to 400 blows per minute, according to size, and, the hammer running in slides, each blow is square and in the same place. Die work can be done under them more rapidly than under a drop, and for swaging it is unequaled. They are very simple in their construction, under perfect control, and require much less power than any other hammer. Send for a circular illustrating the hammer, which gives full particulars. 22 12

TREMPER'S CELEBRATED DROP CUT-OFF AND GOVERNOR COMBINED is the best Cut-off and the best Regulator in existence; will save 20 per cent or more of the fuel, or give 20 per cent more power. They can now be supplied at short notice, being now manufactured in this city; also at Buffalo, N. Y. Particulars sent free. Address JOHN TREMPER, No. 316 North Third street, Philadelphia, or E. Weston, Agent, Vulcan Foundery, Buffalo, N. Y. 22 3*

SAW GUMMERS, UPSETS, SWEDGES AND OTHER Saw Tools made by G. A. PRESCOTT, Sandy Hill, N. Y. 22 4*

THEYSON & OGG, NO. 39 GREENE STREET, NEAR Grand, Machinists, Brass Finishers and Model Makers, Experimental Machinery. Indicators, Registers and Steam Gages of every kind accurately and promptly made. 22 12*

SCREWS.—COMSTOCK, LYON & CO., OFFICE NO. 74 Beekman street, N. Y., manufacture Turned Machine Screws (a superior article to a headed screw), of all sizes under ½ inch in diameter, 3 inches long. Also Steel, Iron and Brass Screws for Guns, Pistols, Instruments, Trusses, Artificial Limbs, Etc, of the finest quality, to order. 22 15*

FOR DANIELS AND WOODWORTH PLANERS AND other Wood-working Machinery, with the latest improvements, address the manufacturers, RICHARDSON, MERIAM & CO., Worcester, Mass. 22 6*

GRINDSTONES OF THE BEST QUALITY MANUfactured for Mechanics, Railroad Shops, Manufacturers and the trade Address orders to F. M. STEARNS & CO., 22 11* Berea, Cuyahoga Co., Ohio.

THREE HUNDRED DOLLARS WILL BUY THREE useful Unpatented Inventions. One is a simple device for attaching an 1 cancelling stamps at one operation. All can be manufactured at small cost. For further particulars address J. H. MARTIN, Hartford, Washington Co., N. Y. 1*

AMES' IRON WORKS.—THIS ESTABLISHMENT IS for Sale or to Rent. It employs one hundred and thirty to one hundred and fifty men and is now doing a large and profitable business. The buildings are brick, and with its extensive machinery, nearly new, large and convenient. Terms moderate. The poor health of the proprietor requires a relaxation from business. H. M. AMES, 22 2* Oswego, N. Y.

THE UNRIVALED ARTIFICIAL LIMBS OF DR. DOUGLASS, of Springfield, Mass., are superior in adaptability to all forms of amputations, strength, durability, and the most life like articulations of the natural limbs. Illustrated pamphlet sent free. Recommended by the leading surgeons. 22 2*

SALAMANDER FIRE-BRICK WORKS. (Established 1825.) Works at Woodbridge, N. J. Office and Depot foot of Hammond street, New York. 21 4*

PARTNER WANTED. – AN ACTIVE PARTNER, with $8,000 to $10,000, in a Machine Shop and Foundery, in the Oil Regions, now building. Address S. CABOT, 21 4* Franklin, Pa.

INVENTORS' EMPORIUM, NO. 37 PARK ROW, N. Y. —New and useful inventions manufactured, introduced and sold on commission. Agents wanted. [21 2*] RICE & CO.

TO RAILROADS AND MACHINISTS WANTING GOOD TOOLS.—For sale for immediate delivery, 3 36-in. Lathes, 18-ft. Shears; 1 Planer, 24 in. square, 6 ft. long; 1 Bolt-cutter. We have under way 2 Planers, 32-in. sq., 9 ft. long, and 4 8-ft. Shapers. 21 3* E. & A. BETTS, Wilmington, Del.

STEAM ENGINE FOR SALE—ONE 15-HORSE Power.—Root's Double Reciprocating. For engraving and description of which see SCIENTIFIC AMERICAN, Vol. X., page 193. Has been used about 3 months. Reason for selling now, use water power. Cost $800. Price $5.0. Address NELSON P. AKIN, 21 7* Philmont, Col. Co., N. Y.

UNFINISHED ENGINE FOR SALE.—I WILL SELL for $20 the following parts of a new Steam Engine, all in good order; Cylinder 2½ by 6-in stroke; Steam Chest, Valves, Bed Plate, Cross-head, Piston and Rod, Cylinder Cover. 21 E. P. WATSON, Box 773, New York.

TO AGRICULTURISTS AND SCIENTIFIC MEN.— For Sale—A complete set of the "Natural History of the State of N. Y.," 22 vols. and map, $100; Annual Reports of "N. Y. W. Agricultural Society," complete, except 1841-3 and 4, 20 vols. Set Annual Reports of "American Institute," 19 vols The above in complete order. Address G. J. G., Box 131, Syracuse, N. Y. 21 2*

MACHINISTS' SUPPLIES, OF ALL DESCRIPTIONS, on hand for sale by LEACH BROS., 85 Liberty st., N. Y. 21 12*

FOR SALE—ONE IRON PLANER—WILL PLANE 20 feet long, 4 feet wide, and 3 feet 8 inches high in clear; it has two sliding heads on cross bar, to work two tools at the same time; it will weigh about 12 tuns; has been some used; is now in first rate working order; is of modern build; can be seen in operation at our factory, where all kinds of Machinists' Tools are made to order. Nos. 4 and 6 Hill street, Rochester, N. Y. 21 4* A. M. BADGER & CO.

SPOKE AND HANDLE MACHINERY.—THOSE DESIRING to purchase the best machine in the United States for making Spokes, Yankee Ax Handles, Plow Handles, and irregular forms generally, should send for cut and description to E. K. WISELL, Manufacturer and Patentee, at Warren, Ohio. 21 8*

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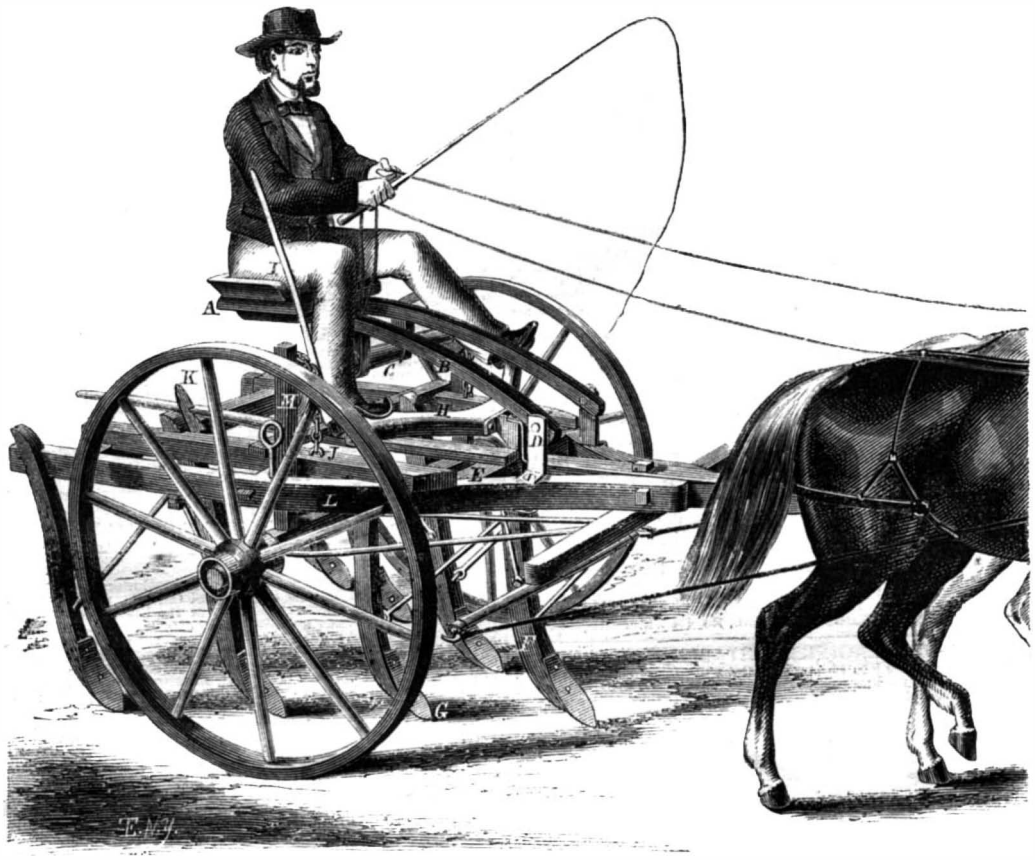
Improved Cultivator and Gang Plow.

This machine is an improvement on those agricultural implements which cultivate growing crops. They save an immense amount of hand labor and should be introduced wherever practicable. The chief thing to be provided in such machines is ease and certainty of management, so that the plows will go where they should, instead of destroying the plants by running over them. It is also important to be able to regulate the depth of tillage accurately, for many reasons obvious to the agriculturist. When the field is planted in regular rows it would not be difficult to drive a team straight through them, but emergencies arise in working when it becomes desirable to move the cultivators laterally to and fro, and, as they are heavy, some method must be provided to do it quickly and properly.



GULICK'S CULTIVATOR AND GANG PLOW

The chief feature of this machine is its adjustable spring seat, whereby the weight of the driver balances that of the plows, thus causing them to run lighter with a more even draft, and affording ready means of lifting them wholly or partially, as may be required. This seat, A, is fixed on the bars, B. The bars have their fulcra at C, and an additional joint at D, which connects to the beam, E, carrying the several gangs of plows or cultivators, F. The foremost and hindmost cultivators are immovable, but the set, G, are connected by rods to a foot bar, H, and through it they are moved to throw the soil against either side, or to steer clear of the plants. The driver, in proceeding to the field, must elevate the plows clear of the road, and to do this there is a lever, I, at his side, which, together with chains, J, and a catch, K, severally perform the end desired, and hold the plows up so that the team may be driven rapidly without fear of their falling. The plows, being fastened to the frame, L, rise and fall with it, and the standards, M, fastened to the axle, guide the frame in its working. Thus all the points of a desirable machine for this purpose are obtained.

This machine has been tested and found to work well both for cultivating corn and other plants, or working fallows, and is not apt to clog with weeds, corn-stalks or other rubbish. It was patented on the 14th February, 1865, through the Scientific American Patent Agency, by Samuel Gulick. Address the patentee at Kline Grove, Pa., for information in regard to purchase of rights or machinery.

How to Fall Asleep.

The great point to be gained in order to secure sleep, is escape from thought, especially from that clinging, tenacious, imperious thought which in most cases of wakefulness has possession of the mind. I always effect this by the following simple process:—I turn my eyeballs as far to the right or left, or upward, or downward, as I can without pain, and then commence rolling them slowly, with that divergence from a direct line of vision around in their sockets, and continue doing thus until I fall asleep, which occurs generally within three minutes—always within five at the most. The immediate effect of this procedure differs from that of any other I have ever heard, to procure sleep. It not merely diverts thought into a new channel, but actually suspends it. Since I became aware of this I have endeavored, innumerable times, while thus rolling my eyes, to think upon a particular subject, and even upon that which before kept me awake, but I could not. As long as they were moving around, my mind was blank. If any one doubts this, let him try the experiment for himself. I wish he would: let him pause just here and make it. I venture to assure him that, if he makes it in good faith in the manner described, the promise of "a penny for his thoughts," or for each of them, while the operation is in progress, will add very little to his wealth. Such being its effects, we cannot wonder that it should bring sleep to a nervous and wakeful man of a night. The philosophy of the matter is very simple. A suspension of thought is to the mind what a suspension of travel or labor is to a weary body. It enjoys the luxury of rest; the strain upon its faculties is removed; it falls asleep as naturally as the farmer in his chair after toiling all day in his fields.—*Anatomy of Sleep.*

Trial of Breech-loading Cannon in Russia.

A most interesting series of competitive experiments between various systems of breech-loading cannon have just been completed in St. Petersburg, before General Barantzoff, the Minister of War; General Majifski, the President, and the members of the Committee of Artillery. At the end, only three competitors remained—the systems of Clay, Whitworth, Armstrong and others being rejected at the preliminary trials. The three favorites were:—The celebrated Prussian steel founder, Mr. Krupp; Mr. Kreiner, a well-known Berlin machinist, and Mr. Broadwell, an American engineer. Mr. Krupp's gun was almost the same as that he sent to Woolwich in 1863, the principal feature of it being an elastic ring in the movable block of metal forming the breech-piece. Mr. Kreiner's is the gun of the Prussian service, of Duppel celebrity. Mr. Broadwell's invention consists in an elastic self-adjusting ring in the bore of the gun, not to be removed after each round like Armstrong or Whitworth's "cups," but large enough to allow the shot and cartridge to pass through. The aperture at the breech is closed or opened by inserting or half-withdrawing a slightly taper, but perfectly plain piece of well-tempered steel. Mr. Broadwell has proved the victor in the competition, Mr Kreiner's gun requiring the assistance of a handspike after forty-seven rounds, and Mr. Krupp's block sticking fast after ninety-five rounds, whereas Mr. Broadwell's gun showed no symptoms of gas escape after 180 rounds. The Russian Government has decided on altering forty pieces already purchased from Mr. Krupp according to Mr. Broadwell's designs. Government should do the same with the Armstrong guns.—*Mechanics' Magazine.*

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